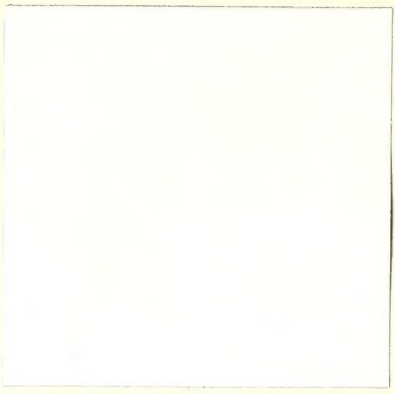



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THE

JOURNAL OF THE SOCIETY OF ARTS,

AND OF THE

INSTITUTIONS IN UNION.

VOLUME XV.

FROM NOVEMBER 23, 1866, TO NOVEMBER 15, 1867.

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THE

Journal of the Society of Arts,

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THE INSTITUTIONS IN UNION.

113TH SESSION.] FRIDAY, NOVEMBER 23, 1866. [No. 731. VOL. XV.

Announcements by the Council.

ORDINARY MEETINGS.

Wednesday Evenings at Eight o'clock :—

NOVEMBER 28.—"On the Effect of Limited Liability Partnership on the Progress of Arts, Manufactures, and Commerce." By WILLIAM HAWES, Esq., F.G.S.

DECEMBER 5.—"On the Trade in Foreign Cattle." By JOHN IRWIN, Esq.

DECEMBER 12.—"On Old London: its Streets and Thoroughfares." By J. G. CRACE, Esq.

DECEMBER 19.—"On the Study of Indian Architecture." By JAMES FERGUSSON, Esq., F.R.S.

CANTOR LECTURES.

The first course of Cantor Lectures for the present session will be "On Pottery and Porcelain," and will be delivered by William Chaffers, Esq. It will consist of six lectures, and will commence on Monday evening, the 21st January next. and be continued on succeeding Monday evenings.

The second course will be "On Music and Musical Instruments," to be delivered by John Hullah, Esq. Arrangements for a third course are in progress.

The lectures will commence each evening at eight o'clock, and are open to members, each of which has the privilege of introducing one friend to each lecture.

SUBSCRIPTIONS.

The Michaelmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

A new list of members of the Society has been printed, and any member can have a copy sent to him on application to the Secretary.

Proceedings of the Society.

FIRST ORDINARY MEETING.

Wednesday, November 21st, 1866; Sir THOMAS PHILLIPS, Q.C., F.G.S., Chairman of the Council, in the chair.

The following candidates were proposed for election as members of the Society:—

Aston, J. Wood, Cradley, near Birmingham.
Bellows, John, Steam Press, Gloucester.
Birt, William Jacob, 23, Sussex-gardens, Hyde-pk., W.
Bond, John James, 39, Queen Anne-street, W., and Public Record Office, E.C.
Bosanquet, Horace Smith, Broxbournebury, Hoddesdon.
Bradley, Lonsdale, Prior's House, Richmond, Yorkshire.
Brett, Jacob, Portland Hotel, Great Portland-street, W.
Bryceson, Henry, Brook street, Euston-road, N.W.
Carr, Jonathan, Twerton Mills, Bath.
Clarke, Samuel, 110, Albany street, N.W.
Clay, Rev. Walter L., M.A., 30, Harewood-square, N.W.
Colls, Benjamin, 28, Moorgate-street, E.C.
Cooke, William, 12, Friday-street, E.C.
Dixon, John, 5, Abchurch-yard, E.C.
Ferguson, Robert, Morton, Carlisle.
Ferrabee, James, Port Mill, Brimscombe, near Stroud, Gloucestershire.
Freeman, John, Woodland House, Falmouth.
Gill, Henry Septimus, Tiverton.
Harrison, J. S., F.R.C.S., Lancaster.
Henry, Sir Thomas, 23, Hanover-square, W.
Hill, William, jun., 60, Bishopsgate-street-within, E.C.
Hynam, John, 7, Wilson-street, Finsbury-square, E.C.
Ince, Joseph, 26, St. George's-pl., Hyde-pk.-corner, S.W.
Lambert, William, 4, New Basinghall-street, E.C.
Layton, Charles Edwin, 150, Fleet-street, E.C.
Le Braithwaite, Charles, Jun., Kendal, Westmoreland.
Mair, Robert H., 65, Ludgate-hill, E.C.
McNeill, James, 35, Hopeton-street, Belfast.
Murray, Robert, Kinnahaird, Dingwall, Ross-shire, N.B.
Naylor, William, Manor-place, Paddington-green, W.
Patalano, Enrico, 5, Laurie-pl., Percy-cross, Fulham, S.W.
Perry, Joseph John, 37, Red Lion-square, W.C.
Phillips, Charles Thomas, Windsor.
Pols, John A., 26, Bucklersbury, E.C.
Pugh, Edward, Wrotham House, York-rd., Holloway, N.
Richardson, John, Tutbury, near Burton-on-Trent.
Sanguinetti, Francis B., 63, Jermyn-street, S.W.
Shields, John, Durham.
Slater, James A., 23, Denmark street, Soho, W.C.
Sorby, Thomas Charles, 27, Brunswick-square, W.C.
Strutt, The Hon. Arthur, Milford, near Derby.
Tonks, William Henry, Moseley-street, Birmingham.
Trewby, William George, Coburg-house, Waterloo-rd., S.
Watts, Isaac, Cotton Supply Association, 1, Newall's-buildings, Manchester.
Williams, Oliver John, Harwich.
Young, H., 16, Carthusian-street, Aldersgate-st., E.C.

The CHAIRMAN delivered the following

ADDRESS.

The duty of delivering the opening address of the session is imposed on your Chairman, and I owe to the favourable opinion of my colleagues in the Council the honour of again presiding over

their deliberations. Permit me to say, in all sincerity, that I undertook the task with hesitation, familiar as I am with the marked ability, the energetic spirit, and the unwearied devotion to the interests of the Society which characterized my esteemed predecessor, Mr. Hawes, who, for the term of three years, presided over our deliberations with so much efficiency and success.

At the commencement of each session our attention is naturally directed to the losses we have sustained among our members; and those of our body who have been removed by death in the year which has now closed include men who had rendered services to the Society, and possessed claims to the grateful recognition of the public.

The first of our members in order of time of whom we were deprived last year was Captain Fowke, R.E., who died suddenly from the bursting of a blood vessel on the 4th Dec., 1865. As a man of science, possessing great fertility of invention, he held the highest reputation amongst his brother officers of the Royal Engineers. He was secretary of the English Commission in the Paris Exhibition of 1855, and afterwards became engineer of the South Kensington Museum. Called on to design the gallery for exhibiting the pictures given by Mr. Sheepshanks to the nation, he, in concert with Mr. Redgrave, R.A., reduced to an accurate formula the principles for building a picture gallery so that the paintings might be seen without glitter or reflection. He evinced great capacity for economising the consumption of materials, and many sheds for volunteer corps have been constructed from his plans at small cost. He prepared one general plan for the Horticultural Gardens; and the designs for the conservatory, so greatly admired, as well as for the south arcades of the gardens, were supplied by him. In this work he revived the use of terra cotta. which had been so much employed as a material in the architecture of Italy. He had completed before his death the greater part of the designs for the South Kensington Museum, and it will be possible from the materials he has left to execute his intentions. He was the architect of the International Exhibition of 1862, the object of the Commissioners being to fill a large space at a limited cost in such a way that the building might be made permanent. The structure was pronounced by competent judges most successful for the purposes of exhibition, but the House of Commons declined to purchase the building at the cost of the old materials, which were thereupon taken down and removed. In a competition open to the world four judges unanimously awarded the first prize to his design for the Natural History Museum buildings, proposed in 1864 to be erected at South Kensington, and the public may hope to see that design yet realized. Captain Fowke largely contributed to the decorative use of iron in architectural works, and had he lived would, it is believed, have earned high distinction; but a career of promise was cut short at the early age of 42. Although the plans of the International Exhibition aroused much controversy at the time, there is now no desire to depreciate the abilities of Captain Fowke, and the amiable personal character by which he was distinguished has received just appreciation by all to whom he was known.

Colonel Sir Charles Beaumont Phipps, K.C.B., Keeper of Her Majesty's Privy Purse, was a valued member of the Society; and when the Exhibition of 1851 was matured by the late Prince Consort, Sir Charles performed good service by contributing to the effective organization devised by the Prince for the conduct of the Exhibition. He had been appointed in 1846 private secretary to his Royal Highness, in whose service he continued till the death of the Prince. He was named on the Council of the Prince of Wales for the Duchy of Cornwall, and was made a Knight Commander of the Bath in recognition of his faithful services to Her Majesty. He died on the 24th February, 1866, aged 64.

Mr. Barnett Blake, Secretary of the Yorkshire Union since 1856, and visiting officer to the Society of Arts in that district, died on the 14th March. The ability, earnestness, and fidelity which Mr. Blake manifested in the discharge of his duties were most remarkable. His loss will long be deplored, not only by the institutions whose success he was so anxious and able to promote, but by the Society of Arts, whose educational work in the Yorkshire district he carried on with great efficiency, and he will be especially missed at the annual conferences of the Institutions, in which he always took a prominent part.

Mr. Charles Wye Williams died on Monday, April 2nd, aged eighty-seven. In 1823 the City of Dublin Steam Packet Company was formed, under the style of Charles Wye Williams and Co. Six steamers were successively built, and the present style of the company was acquired under the provisions of a charter granted in 1828, Mr. Williams continuing, until within the last few years, to be the managing director. Mr. Williams, at a very early date, applied water-tight bulkheads to divide ships into separate compartments. The first edition of Mr. Williams's treatise on the combustion of coal was printed in 1839. He invented a model boiler and furnace for the complete combustion of coal, with which he entered the lists in the great competition of makers of marine steam-boilers at Newcastle for the £500 prize. The professional umpires on that occasion were Sir William Armstrong, Dr. Richardson, and Mr.

Longridge, who decided in favour of Mr. Williams's system. For an essay on "The Prevention of the Smoke Nuisance," Mr. Williams received, in 1856, the Society of Arts' £25 Gold Medal, the value of the prize being enhanced by its presentation by the late Prince Consort.

Mr. Richard Garrett, the eminent agricultural implement manufacturer, died on the 26th June, in his 60th year. While Mr. Garrett was yet a young man—in the spring of 1836—the business of his father at Leiston, Suffolk, to which place his grandfather had gone as a sickle maker and blacksmith in 1778, was relinquished in his favour. At that time about 60 men and eight or ten horses were employed, but no steam power had yet been called into play. The once small village has now become a town of more than 2,000 in habitants, all dependent on the Leiston works. The 60 workpeople have increased to 600, the horse power has given place to steam, and the name of Garrett has become known throughout the world.

Mr. Robert Temple, Master of the Supreme Court at Mauritius, died in July, having held that appointment three years, and been previously, for eighteen years, Chief-Justice of British Honduras, where he did much to call attention to and develop the industrial and commercial resources of the colony. He was elected a member of the Society of Arts in 1855, but even previously to that time, while in Honduras, he forwarded numerous interesting and valuable contributions to the *Journal* upon the resources of that colony. On his return to England he was a frequent visitor at the house of the Society, and took much pleasure in attending its meetings.

William Fisher Hobbs, a distinguished agriculturist, died on the 11th of October. He was a highly successful breeder of stock; farmed largely and well; and was one of the founders of the Royal Agricultural Society of England, of the Council of which he was long a distinguished member.

The Right Hon. Sir James Lewis Knight Bruce, D.C.L., F.R.S., and F.S.A., late Lord Justice of the Court of Appeal, died at Roehampton Priory, Surrey, on the 7th inst. He was born in 1791, was entered as a student at Lincoln's Inn in 1812, and was called to the bar in 1817. After attending the Welsh Circuit for some time, he joined the Chancery bar, and soon became a leading member of the profession. In 1829 he was appointed a King's Counsel, and in 1831 was returned to Parliament as member for Bishop's Castle, a borough which was shortly afterwards disfranchised by the passing of the Reform Bill. In 1837 the late Lord Justice, then Mr. Knight, applied for and obtained the Queen's license to use the surname of Bruce, from motives of affection and regard for the family of his mother, who was descended from a cadet of the house of Bruce of Clackmannan. The length of time which has elapsed since he was in practice at the bar has much effaced the memory of his powers as an advocate; but those who remember him as one of the leading counsel in the court of Vice-Chancellor Shadwell, in the times when the late Mr. Jacob and Mr. Sugden (now Lord St. Leonard's) were also in practice there, speak of him as second to none, either of that day or since, in brilliancy, force, or learning. He had both great quickness and great acuteness of intellect, and his faculty for business was unrivalled. But what he was chiefly remarkable for was his singular gift of language—combining a rare felicity and terseness of expression with a wonderful fluency, yet never wandering from the point. When Parliament decided, in 1841, that two additional judges were necessary for the assistance of the Lord Chancellor, Mr. Knight Bruce was selected for the important office of Vice-Chancellor, received the honour of knighthood, and was shortly after sworn a member of the Privy Council. No amount of labour seemed to distress him. Shortly before the long vacation of 1850, at the most pressing period of the year, the illness of the other Chancery judges obliged him to undertake the whole business of the three courts. He despatched the business with so much discrimination, ability, and good temper, that a public expression of respectful admiration was elicited from the whole bar, in an address from the Attorney-General. When the Court of Appeal in Chancery was organised in October, 1851, Sir James Knight Bruce was selected for the senior Lord Justice, Lord Cranworth being the junior. He was a bencher of Lincoln's Inn. His nephew, the Right Hon. Henry Austin Bruce, M.P., the son of the Lord Justice's elder brother, was formerly Under-Secretary of State, and afterwards Vice-President of the Council.

There remain to be noticed two men, of whom one had never been, and the other had ceased to be, a member of this Society; yet both deserve grateful recognition in this room for services rendered in the promotion of important measures undertaken by the Society. I allude to Sir Charles Lock Eastlake, and the Rev. William Whewell, D.D.

Sir Charles Eastlake, President of the Royal Academy, died at Pisa, on the 23rd of December last. He was born on the 17th November, 1793, was educated at the Charterhouse, and studied at the Royal Academy, under Fuseli. After visiting France, Italy, and Greece from 1817 to 1820, he took up his abode at Rome, where he remained several years. He first exhibited at the Royal Academy in 1823. In 1827 he was elected an Associate of the

Academy, and in the year ensuing he produced his "Pilgrims Arriving in Sight of Rome." In 1830 he attained the rank of Royal Academician, and returned to England. The reputation attained by Mr. Eastlake, both as an artist and connoisseur, led to his appointment, in 1841, by Sir Robert Peel, to the office of Secretary to the Royal Commission of Fine Arts. In 1843 he was appointed Keeper of the National Gallery, an office which he resigned in 1847. In 1850, on the death of Sir M. A. Shee, he was elected President of the Royal Academy, and received the honour of knighthood. In 1855 he was appointed director of the National Gallery; and in that office, by watchful care and by judicious and successful purchases for the nation, he has raised our national collection of paintings from the character of a cabinet to the position of a gallery, which may now well take rank among the great collections of Europe. Sir Charles Eastlake has made several valuable contributions to the literature of the Fine Arts, among which may be mentioned his translation of "Goethe on Colour," "Notes to Kugler's Handbook of Italian Painting," and "Contributions towards a History of Oil Painting." He was one of the trustees of the National Portrait Gallery, a trustee of the British Museum, a Knight of the Legion of Honour, and a Fellow of the Royal Society. Sir Charles Eastlake took great interest in the proceedings of the Society of Arts on the subject of Artistic Copyright, and acted as chairman of the Society's committee which succeeded in procuring the passing of the "Art Copyright Act, 1862."

The Rev. William Whewell, D.D., Master of Trinity College, Cambridge, died on the 6th of March. His father was a carpenter or joiner at Lancaster, and it was intended that William, the son, should follow the same calling. Fortunately, he had been sent to the Free Grammar School of his native town, where he discovered such genius for mathematics, that the head master prevailed upon the young man's parents to allow him to be sent to Cambridge. He entered Trinity College about the year 1813, took his degree of B.A. in 1816, and became a fellow of his college, which was his home for more than half a century. In 1828 he was appointed Professor of Mineralogy, a post he held for four years; and in 1838, Professor of Moral Philosophy, which chair he retained till the year 1855, when he was elected Vice-Chancellor of the University. He succeeded to the Mastership of Trinity in 1841. In 1820 he had been made a fellow of the Royal Society, in the labours of which he always took a prominent part, as well as in those of the British Association for the Advancement of Science, over which he presided at Plymouth in 1841. Members will recollect that when a course of lectures was delivered before the Society in 1852, on the results of the Great Exhibition of 1851, the inaugural lecture was given by Dr. Whewell, the subject being "The General Bearing of the Exhibition on the Progress of Art and Science." He also in 1854, on the occasion of the Society's Educational Exhibition, delivered a lecture on "The Industrial Helps to Education." Besides great special knowledge on particular subjects, he was probably, of all his contemporaries, the man of most universal information. His scientific views were most enlightened, and he was at the same time thoroughly sound as a Christian. With a rough temper and rough manner he was open, generous, and forgiving. His liberality in money matters was unbounded, and was evidenced by the noble provisions made, both in his lifetime and at his death, for the college he so much loved.

The address of your Chairman is intended to indicate the policy which the Council design to pursue during the session on which they are entering, but any exposition of intended action which did not connect the history of the past with the policy of the future would be deficient in interest and of doubtful advantage. With Societies as with individuals gradual growth is the foundation of progressive improvement and of increased usefulness, and as in the natural world the flower or the tree owes its value to successive stages of existence, so in man's works the harvest of one period may be due to the seed-time of many former seasons.

Amongst the anticipated triumphs of art and industry in the coming year, none will be regarded with more interest by this Society than the Universal Exhibition to be held in Paris, which will be the second display of that character undertaken in the French capital. When the Prince Consort explained the views by which he was prompted to originate and direct the first great exhibition in this country, he stated that the Exhibition of 1851 was intended to give us a true test and living picture of the point of development at which the whole of mankind had arrived in the great task of employing science, industry, and art in the service of man, as well as a new starting-point from which all nations would be able to direct their own future exertions. The language then impressively used by His Royal Highness may be recalled by us with advantage—"Science discovers the laws of power, motion, and transformation; industry applies them to the raw matter which the earth yields us in abundance, but which becomes valuable only by knowledge; art teaches us the immutable laws of beauty and symmetry, and gives to our productions forms in accordance with them."

In the opening address of last session my

predecessor gave expression to the sanguine expectations which have been formed of the Paris Exhibition of next year, and to the belief that such a display will be made on that occasion in every branch of art and manufacture as has never yet been equalled in extent or interest.

The Exhibition building in the Champ de Mars is rapidly approaching completion, and rises from the surrounding park like a gigantic Coliseum. The ground plan is that of a large oblong figure with straight sides and rounded ends, something like, but not an ellipse. The longer axis forms a line from the Pont de Jena to the Ecole Militaire, and is 535 yards long, and the smaller axis, which is at right angles to it, is 415 yards in length. The building is of one storey only, and covers a space of about 35 acres. In addition to this building the park itself is rendered available for the display of articles in two of the ten groups into which the exhibition is divided. Those two groups will include articles for which the interior of the building is not suited, such as agricultural implements and model buildings, as well as machines and apparatus for the exhibition of which the direct application of fire is necessary. The building itself has been specially arranged so as to present a division or separation of the objects exhibited, not only by countries, but also by classes, an idea which is not new, for it was actually proposed by this Society for the Exhibition of 1862; but at that time, for reasons unnecessary to enter into here, that plan was not adopted. The building presents a series of concentric passages, in juxta-position with each of which one of the groups into which the classification is divided will be shown, whilst each country has a segment of the oval divided by passages radiating from the centre; so that in passing round the building by any one of the concentric passages, we shall come upon each country in succession, and shall find in each group objects of the same class.

The system of classification which has been adopted differs entirely from any hitherto devised, and forms a special feature of the Exhibition, the shape and arrangements of the building having been specially adapted for the display of the objects thus classified. The classification is based on the idea that these exhibitions are intended to bring into notice all the resources which industry can create for satisfying the wants of mankind, and the Exhibition is divided primarily into groups, which are intended to correspond with the great wants of the human family. The wants thus common to all people are divided into the following departments :—

Food.
Clothing.
Dwellings.
Raw materials and their treatment.
The liberal arts.
The fine arts.

These divisions are considered by the French authorities to represent everything connected with the industry of a people, and they form the basis of the following groups :—

1. Works of art.
2. Materials used in the liberal arts.
3. Furniture and articles necessary for dwellings.
4. Clothing and articles required for the person.
5. Products, raw and manufactured, connected with mining industry, forestry, &c.
6. Apparatus and processes used in the arts.
7. Food (fresh and preserved) in various states of preparation.
8. Live stock and specimens of agricultural buildings.
9. Growing vegetable products and specimens of horticultural apparatus.
10. Articles exhibited with the view of improving the physical and moral condition of the people.

These ten groups are again subdivided into classes, amounting in all to ninety divisions.

The classification adopted in our Exhibition of 1851, and which, with certain modifications, was followed both in Paris in 1855, and in London in 1862, consisted of four great departments :—

1. Raw materials which nature supplies for the industry of man.
2. Machinery by which man works upon those materials.
3. Manufactured articles produced by man's labour.
4. The art which man employs to impress them with the stamp of beauty.

These departments were again subdivided into classes, which amounted in all to 30 in 1851, and to 36 in 1862.

The proceedings in Paris are under the management of a Commission, of which the Prince Imperial is honorary President.

The English arrangements are entrusted to the Government Department of Science and Art, aided by a Royal Commission, of which His Royal Highness our President is Chairman, and on which the Council of this Society is represented by your Chairman and other members.

The London Committees for the allotment of space in most of the classes have held their meetings at the house of the Society, under the superintendence of your Secretary, and have divided the space placed at their disposal.

At the former Exhibition of 1855 the members of the Society, in their collective character, paid a most interesting visit to Paris, and it

will be a question for consideration whether a similar course may not be advantageously adopted in the coming year. Such a meeting of gentlemen interested in the various branches of art and manufacture would doubtless afford many opportunities for the interchange of valuable information, as well as for pleasant social intercourse, and the French authorities would probably grant special facilities to an influential body of visitors for an intelligent and careful examination of many of the leading manufactories and public works in and near the French capital.

It is the anxious desire of the Council that the industry and art of this country should be adequately represented at the Exhibition, where the best productions of France in their respective classes will assuredly be found, and where the great skill and taste of the French workman in many departments of labour will receive ample encouragement. Exhibitions of works of industry and art, especially those of an international character, have been, and are watched with great interest by the Society.

Members present are, no doubt, aware that previously to 1851 an active part was taken by the Society in establishing from time to time exhibitions of the products of industry and art, and that the preliminary measures for holding the Exhibition of 1851 were organised by the Society, under the direction of their President, and the plan then sanctioned by H.R.H. included the establishment of periodical Exhibitions. But for the active labours of the Council, and the generous support of the members of the Society, the Exhibition of 1862 would not have been undertaken, and the Exhibition of 1851 might have had no successor in this country.

The Council collected and published, at considerable cost, the reports of the juries on the 36 classes into which the Exhibition of 1862 was divided, a work which the Commissioners declined to undertake, and which, notwithstanding its great interest, would, but for the intervention of the Society, in all probability have never been given to the world; and yet in no other way could an accurate or a faithful estimate be supplied of the remarkable productions exhibited on that occasion, and all who are familiar with this valuable collection of reports will be materially assisted in appreciating the extent, the grandeur, and the value of the Exhibition of 1862.

The Examinations conducted by the Society in the various subjects of education continue to afford valuable encouragement to artisans and other working men, as well as to those members of other classes who desire to improve and extend the school instruction they may have acquired in early life. Those Examinations, embracing a great variety of subjects, including language, literature, science, and the mechanical arts, have, year by year, produced an increasing number of students. Propounded by the Society in 1853, the system has extended itself, through the instrumentality of the Local Educational Boards, to about 100 of the most important centres of population in the United Kingdom; and those Boards, for the most part, have not only assisted to conduct the Society's Examinations, but have held other preparatory examinations with the view of enabling younger and less-advanced persons to become in after years candidates for the Society's certificates and prizes. By such means the Society has, both directly and indirectly, afforded widespread encouragement to the education of adults of the industrial classes, and the example which was set by the Society has been effectively followed by the Government Department of Science and Art in the system of annual examinations which is conducted by that department, and by the Universities of Oxford and Cambridge in their systems of local examinations, all of which resemble in their principal features the plan originated and still conducted by this Society.

Although the number of students examined this year is less than in 1865, when they amounted to 1,199, they exceed by 29 the candidates in 1864, when the number examined was 1,068, and we may hope next year to witness a continuance of that progress which, since these examinations were established, has characterised this important branch of the labours of the Society, which the Council propose to continue without change.

The money value of the prizes gained in 1865 was £211 5s., and is this year £233 5s., including that of the Prince Consort and those of the Royal Horticultural Society.

The Prince Consort's prize is won this year by James Rigby Smith, of the City of London College, who, in the present and four preceding years, obtained seven first-class certificates.

The Council is deeply sensible of the importance of every agency for encouraging young people, whether male or female, to prolong their school life, by dividing their time between study and labour. Those who have paid most attention to the elementary education of the working classes, and are most familiar with their condition and character, have come to the conclusion (reluctantly it may be) that the school life of the working man's child cannot be much prolonged; that, in the conflict between the schoolroom and the workshop, he will be early removed from the former; and that, if his school instruction is to be continued, it must be in combination with the latter.

We daily see how much can be done in the work of self-improvement by lads who work during the day, and afterwards attend evening schools. Hence we believe in the importance

of the work the Society has undertaken by its system of examinations, and we trust that the future progress and extension of this work may fully answer the expectations of the Council. The expenditure of the Society in this branch of its operations is liberal; the examiners engaged are men of distinction, and it is hoped the results may increase year by year, and thus leaven with intelligence a growing number of our people.

For the last two examinations the Society has enjoyed the great advantage of the co-operation of the Royal Horticultural Society, who have liberally offered prizes to candidates in botany and the practical arts of cultivating fruits, flowers, and vegetables; and this example has been followed by the proprietors of the *Gardener's Chronicle*. I am also happy to say that for next year's Examination the Royal Geographical Society offers an additional prize to candidates in the subject of Geography. If other societies and public bodies would unite in like manner with this Society, in extending a knowledge of the examinations, in offering encouragements to those who may become candidates for the Society's rewards, and in publicly recognizing the value of its certificates, the system would produce greater results, and more public benefit would flow from the exertions of the Society.

Art-workmanship and the improvement of the taste and skill of art-workmen are subjects which have for several years engaged the attention of the Council. The Exhibition of 1862 brought under the public eye the works of skilled artisans of our own and other countries in various departments, and the Council, sensible of the importance of stimulating the English workmen to rival the best workmen of other countries in their several employments, appointed in 1863 a committee to consider and report on the subject of art-workmanship; and, on the recommendation of that Committee, the Council offered prizes in that year to the amount of £162 for the successful production from prescribed designs, in various materials, of representations of the human figure and of ornamental works. In 1864 and 1865 the plans of the Council were enlarged, and competition was invited on a much extended scale,—prizes to the amount of £623 in the former and £666 in the latter being offered by the Society. Some disappointment was felt that the large sums offered by the Society in prizes did not produce a larger number of prize works, the sums awarded by the judges being in 1864 £109, in 1865 £274, and in 1866 £174. A discussion on the subject took place in these rooms on the 2nd March last, when the whole question was fully considered and several suggestions were made with the view to a reconsideration of the character of the prizes to be offered and the conditions of competition. These suggestions were taken into consideration by the Council, who introduced modifications of their former scheme. In the *Journal* on the 4th May last they inserted a programme of the scheme for the present session, under which prizes to the amount of £636 have been offered for public competition in the production of carved works in marble or other stone or in wood or ivory, *repoussé* works in any metal, chasing in bronze, etching and engraving on metal, enamel painting on copper or gold, painting on porcelain, decorative painting, inlaid work in wood, ivory, or metal, cameo cutting, engraving on glass, wall mosaics, gem engraving, die sinking, glass blowing, bookbinding and leather work, embroidery, illuminations, &c.

It will thus be seen that the plans of the Council extend to a great variety of the employments of art-workmen, and that the rewards they offer for excellence, both in design and in workmanship, are numerous and substantial.

It seems to the Council important to enlist the sympathies and obtain the co-operation of the wealthy City Companies in the movement they have undertaken, and, bearing in mind the influential share taken in former ages by Corporate Guilds in fostering the skill and industry of the artisan classes, the Council addressed a circular to many of the City Companies, explaining their plans, and suggesting how important would be found the co-operation of those influential bodies in the work, either by the offering of prizes themselves for works connected with the industries to which their guilds originally belonged, or by contributions made to the prize fund established by the Society. Two Companies, namely, the Salters and Plasterers, immediately supported the movement, one by giving a donation, and the other by offering special prizes, to be competed for by artisans, apprentices, and students. The Coach and Harness Makers Company have contributed prizes to be competed for in the Society's Examinations; and the Council have reason to believe that similar contributions, as well as contributions to the Art Workmanship Prize Fund, are at this moment under the consideration of the governing bodies of several important companies. The Council trusts that these influential corporations will go hand in hand with the Society of Arts in the kindly recognition and judicious encouragement of the artisan class.

The Committee appointed by the Society in 1865 to consider and report on the state of musical education at home and abroad, of which His Royal Highness, our President, is chairman, pursued their investigations actively and usefully. The Committee obtained full information of the constitution, present state, and working of the Royal Academy of Music, and of the other schools for affording musical instruction in or near London, as well as of the

provisions existing in our cathedral churches for teaching church music. Through the Foreign Office reports were obtained of the regulations and condition of the several musical Academies at Paris, Munich, Vienna, Prague, Leipzig, Milan, Naples, and Berlin, whilst by means of the personal visit of the Secretary of the Society to Brussels and Liège, reports were obtained on the musical institutions of those Belgian cities. Many of the most distinguished musical authorities of this country, both professional and amateur, either appeared personally before the Committee, or favoured them with written explanations of their views. By these various agencies there has been collected a large mass of very valuable evidence, together with suggestive information and opinions, which have been published from time to time in the *Journal*, and more recently those materials, together with the first report of the Committee, have been published in a collected form, and are submitted by the Council to the consideration, not only of the members of the Society, but of all who take an interest in the musical education of our people. It may be truly said that there are but few in this day to whom the subject does not commend itself; and the wide cultivation and practice of music render it unnecessary to dwell on the value and national influence of this branch of the fine arts.

The Committee did not consider it within their province to inquire into the relative merits of the various systems of teaching music, but their attention was, for the most part, directed to a consideration of the principles and nature of the administration by which, in their judgment, the musical education of the people of this country may be conducted on a scale, and with benefits at least equal, to those of Continental Academies. The Committee reported the following conclusions :—

1. That adequate parliamentary funds, with ministerial responsibility for their expenditure, are essential to the establishment and maintenance of a National Academy of Music worthy of its object.

2. That gratuitous education should be afforded in such Academy to a limited number of persons having great musical gifts, who, after proper training at the public expense, would engage to devote their talents to the service of the public as professors of the art of music; and that the form in which parliamentary assistance could be best afforded would be by scholarships, which should be held by candidates who, in open competition, had proved that they are endowed with the gift of musical ability. That besides the training of free scholars, the Academy should be open to the public at large on the payment of adequate fees, which might be graduated according to the musical ability of the pupil, and be auxiliary to the support of the institution.

3. That as soon as the Institution shall obtain public confidence it may be hoped the cathedrals and other corporations would provide the means of sending to the Academy young persons of musical genius; and that it be recommended to the Society of Arts to set the example of such endowments by establishing a limited number of scholarships.

4. That before Parliament can be asked to increase its present vote to the Royal Academy of Music the Academy should provide, through the voluntary aid of the public, permanent and suitable premises, possessing all requisite facilities for study and practice.

In a subsequent report, the Committee expressed their opinion that at present about 200 students might be fixed on as a proper number to receive gratuitous training, and that the cost of properly educating that number of free students would be £15,000 a-year, being an average charge of £75 a-year for each student.

The reports of the Committee have been under the consideration of the Council, who agreed to communicate them to such bodies and persons as may be named by the Committee, with the view of ascertaining how far they may be disposed to co-operate in promoting the objects recommended by them; and they have, in the first instance, by circular to the members of the Society, invited their co-operation.

The subject of the musical education of our people is now fairly submitted to the judgment of the public; and it will be for the Legislature to say whether parliamentary funds shall be contributed, under appropriate ministerial responsibility, for the establishment and maintenance of a National Academy of Music.

It will be in the recollection of many of the members of the Society that a committee was appointed by the Council in the session of 1857-8 to inquire into the subject of copyright in works of the fine arts, of which the late Sir Charles Eastlake, then President of the Royal Academy, acted as chairman. That committee received from Mr. Roberton Blaine an accurate and comprehensive report of the laws affecting copyright in works of the fine arts, and after very careful consideration of the subject reported that the laws of British artistic copyright were defective and unjust, because they afforded no sufficient protection to artists against the piracy of their productions, and no redress to purchasers for the invasion of their property; that by reason of the defective state of the law direct encouragement was given to an extensive manufacture of spurious works which were sold as originals; that injustice was inflicted on the subjects of

foreign states in which conventions with her Majesty had been entered into for affording, in those states, protection to copyright, and whose works were not protected from piracy in British territories, although protection was afforded in such states to the works of British artists. A Bill, drawn at the request of the Society's Committee by Mr. Blaine, for consolidating the law of copyright, and extending the protection of the law to the works of artists, was approved of by the Council, and, with modifications suggested by the then Attorney-General, was introduced into the House of Commons in the session of 1861, but by reason of the pressure of public business that Bill only proceeded to a second reading.

The law, as it then stood, conferred a copyright in engraving and in sculpture, but none existed in paintings, drawings, or photographs, and it was the object of the Council, whilst giving to artists a copyright in paintings, drawings, and photographs, to consolidate and amend the statute law with respect to engravings and sculpture.

A conference was held on the subject of the Bill with influential members of the Legislature, and acting on their advice the Council resolved to omit from the proposed enactment the consolidation clauses, and to limit its operation to the creation of a copyright in paintings, drawings, and photographs, to continue for the natural life of the artist, and seven years after his death. The Bill, thus altered, was introduced into the House of Commons by the late Attorney-General, and having passed that House, and been considered by a select committee of the House of Lords, obtained the Royal assent in the session of 1862. Was it not strange that until that time our laws gave no protection to artists in the profitable enjoyment of works of genius and imagination, although we acknowledged the rights of labour to be protected in the possession of productions of the rudest industry?

In the early part of the present year a memorial was presented to the Council, signed by a large number of leading artists, painters, sculptors, and engravers, as well as publishers of works of art, in which the attention of the Council was directed to the defective state of the Engraving and Artistic Copyright Acts, and they were asked to prepare such a Bill as would give to proprietors of copyright in works of fine art more effectual protection; the memorialists also suggested that the various international copyright treaties appeared to require that the new Act should, as far as possible, be assimilated to the French law, which appeared to the memorialists to work well, and to prove in France a most effectual bar to piracy. They also brought under the consideration of the Council the effects produced by the employment of photography, whereby every variety of design may be cheaply reproduced, and the piracy of engravings has thus been carried on in the most unscrupulous manner, the employment of hawkers for selling these dishonest productions having been largely resorted to. The memorialists sought a more effectual remedy than is at present provided for such acts of piracy, and, when offences are committed by persons having no fixed abode, they prayed that means might be devised which would render them liable to apprehension and summary punishment. The Council appointed a meeting with the memorialists, which took place in this room on the 2nd February, and was numerously attended. The various allegations of the memorialists were then considered, and the Council undertook to have a Bill prepared, to remedy, as far as might be found practicable, the evils of which they complained, and, in compliance with their wishes, a committee was appointed by the Council to promote the objects of the memorialists. The general legislation of the year was, however, interrupted by the time which was given by the Commons to one subject, and it would have been useless to invite the attention of the legislature to that of artistic copyright. The Council, however, have had prepared a Bill for dealing with this question in what they believe to be the best and most effective manner. This Bill will be brought under the consideration of a committee specially appointed for the purpose, and it is hoped that in the course of the ensuing session some really effective measure may be passed remedying the evils complained of.

In 1859 a paper was read in this room by Professor Leone Levi on trade marks, the recognition of the right to appropriate such marks, the protection that should be afforded to their enjoyment, and the punishment which ought to be imposed on those by whom they might be pirated.

Although the frauds practised by manufacturers and merchants, in employing as their own marks which had been long enjoyed and extensively recognised to distinguish the productions of others, were on that occasion eloquently denounced, it was not until 1862 that legislative remedies for those frauds were attempted by a statute which bears the title of an Act to amend the laws relating to the fraudulent marking of merchandise.

In February of the present year a committee, which included gentlemen connected with leading manufactures, as well as lawyers and others having special knowledge of the subject, was appointed by the Council to inquire into the laws of England and foreign states upon the subject of trade marks, and to consider if any and what amendments are advisable and essential for the purpose of efficiently protecting the owners of trade marks against the piracy thereof,

the Committee being also empowered to communicate with any committees formed with a similar object in the United Kingdom or in foreign countries.

At the first meeting of the committee it was found that a Bill for amending the Act of 1862, and extending the protection thereby sought to be afforded to the rightful owner of trade marks was in preparation by the direction of Mr. Michael Bass, M.P., one of the members of the committee, and at a subsequent meeting the draft of the proposed Bill was laid before the committee, and, having been considered, met with general approval. A paper of much ability was read here by Mr. Underdown in the course of the last session, which elicited a discussion of more than common interest, and on that occasion a general assent was given to the necessity for a registration of trade marks, and for a summary method of procedure against those who make fraudulent use of them. The committee obtained interviews with the Board of Trade, to whom they submitted their views of the legislation which is required to ensure to the honest trader adequate protection, and they have reason to believe that the provisions of the Bill, and especially that portion of the measure which provides for the registry of trade marks, will meet with the approval of that Board. The subject is one which the Council regard with much interest, and, the committee having been re-appointed, it seems hardly necessary to assure the members that a subject of so much importance to the commercial community will meet with most careful consideration in the ensuing session, and every effort will be made to induce the Legislature to pass an Act which may prevent the abuses which have so long injuriously affected the interests of the honest trader and manufacturer.

The extent and character of the exclusive rights which the authors of useful inventions should enjoy, and the means whereby such rights should be protected, are naturally subjects of controversy, especially in an age like our own, characterised by industrial operations of great magnitude and by continued changes in the processes by which skill and labour are applied to the arts of production. Although letters patent have prevailed in this country from a remote period, and the system received legislative recognition in the reign of James the First, an opinion unfavourable to their continuance, has in recent years attained no slight growth. Extensive changes in the system of procedure under which letters patent are granted, and some in their operation after the grant is obtained, were made by the Act of 1852, which forms our modern legislation on the subject. That statute was preceded by an extensive inquiry conducted by a committee of the Society appointed in 1849 for promoting the legislative recognition of the rights of inventors. The committee made several reports, in which they affirmed the principles which ought in their opinion to govern the rights of inventors, but the reforms which they suggested applied to methods of procedure rather than to any alterations of the rights conferred on inventors by the patent laws. The legislation of 1852 was not satisfactory, and dissatisfaction with the operation of those laws, in the form of objections to the mode of obtaining patents and of enforcing them when obtained, led to investigations, first, by a joint committee of the British Association for the Advancement of Science and the Social Science Association, and afterwards by a Royal Commission. Many persons eminent in patent law legislation and science entertain the opinion that no exclusive advantages ought to be conferred on the authors of useful inventions. It would, however, seem that the reasoning by which that opinion is supported is based on the imperfect character of our system of patent laws rather than on a denial of the claims of the authors of useful inventions to be suitably rewarded. A return to the spirit of the ancient policy, which regarded the grant of a patent as a privilege and not a right, would diminish the difficulties by which the question is surrounded, and I would venture to suggest that it should be upon this principle that any attempted improvement in the present law relating to patents should be based. Several valuable discussions have taken place in this room upon the subject, so especially interesting to commercial men; and, should the question be brought again before Parliament during the coming session, it will become a matter for consideration whether such discussions may not be profitably revived at some of our meetings.

In the opening address of the last session my predecessor directed the attention of our members to a disease which had appeared amongst cattle in this and other countries, to which the name rinderpest or cattle plague had been given. On that occasion extracts were read from a paper on the murrain which appeared among our cattle in 1769-70, written by Mr. Dossie, a member of one of the then acting committees of the Society, and printed in 1771.* Although the disease is believed to have visited this country on several occasions in the 17th and 18th centuries, it is doubtful whether it prevailed here from 1771 until the recent outbreak.

In 1665, 1714, 1745, and 1769, the disease appeared in England, and on some of those occasions proved for a considerable period extensively fatal. The disease which appeared in 1745 continued its ravages until 1757; and

* See *Journal*, Vol. XIV., p. 105, &c.

previous to each outbreak here the disease prevailed in Western Europe, and is believed to have been imported into this country on each visitation. Wherever, during war, herds of Russian or Austrian cattle followed the movements of armies, the plague appeared and spread through various countries, and France received the disease many times in the last and present centuries.

It has been stated, on reliable authority, that from 1711 to 1714 Western Europe lost 1,500,000 head of cattle by the plague, whilst from 1745 to 1748 three millions of cattle are believed to have perished from the disease in Western and Central Europe. No accurate record exists of the mortality in our own country, but in Cheshire, which then as now experienced the severity of the disease, 30,000 head of cattle died or were destroyed in a few months during the pestilence which commenced in 1745.

The recent outbreak began in the summer of last year, and the disease was first recognised in the neighbourhood of the metropolis in the month of June, under circumstances which indicated that the metropolitan market was the centre from which it radiated, spreading with much rapidity to the dairies of the metropolis and its vicinity, and extending with fatal and alarming celerity throughout the greater portion of the kingdom. That it was introduced from abroad is a conclusion now generally admitted. The experience we have obtained identifies the English cattle plague with the rinderpest of Eastern Europe, which has usually received the disease through cattle sent into Poland and Hungary from the Russian steppes, where they are fed in large numbers in the provinces watered by the Dnieper and its tributaries. Large herds are yearly driven to Poland, Galicia, Hungary, and other portions of the Austrian dominions; and those countries were, in 1862 and 1863, visited by the disease, and lost large portions of their herds.

The cattle plague may be described as a disease of the class of contagious fevers. How long the morbific matter may remain inactive, or how rapidly, or to what distances it may be diffused is unknown, but that it is contagious in a remarkable degree, and may be conveyed in a virulent form by almost any animal or substance with which it has been in contact, are conclusions supported by all the experience we have acquired.

No specific has been discovered which neutralises or expels the poison, and the disease has hitherto proved fatal to a very large proportion of the cattle attacked.

The progress of the disease in this country was for some time most rapid, and it was regarded with terror in many parts of the kingdom; the following extracts, showing the number of cattle attacked in particular months, are taken from the returns published weekly under the authority of the Privy Council, and are inserted in order to show first the increase, and next the diminution of the disease :—

1865.	July	2,290
„	October	7,965
1866.	January	49,280
„	February	56,542
„	May	8,985
„	August	114
„	October	21

It will thus be seen that the progress of the disease was slow from July to October, and most rapid from that time to February, when it attained its maximum severity, and afterwards rapidly diminished.

The stock of cattle in Great Britain before the outbreak has been thus returned :—

England	3,383,309
Scotland	968,637
Wales, with Monmouthshire	583,701
	4,935,647

The numbers attacked in each of those divisions are thus given :—

		Per cent. of the entire stock.
England	198,476	5·866
Scotland	46,861	4·838
Wales	8,388	1·437
	253,725	5·141

The numbers that either died of the disease, or were killed to arrest its progress, are enumerated thus :—

	Died.	Killed.
England	90,423	77,570
Scotland	28,088	6,263
Wales	5,794	1,180
	124,305	85,013

The numbers recovered or unaccounted for are thus enumerated :—

	Recovered.	Unaccounted for.
England	21,589	8,894
Scotland	10,707	1,803
Wales	1,117	297
	33,413	10,994

The results thus supplied present some remarkable features, of which we may notice, in the first place, the great severity of the disease in some districts, and the partial or total immunity of others from its ravages.

Before the plague appeared, the county of Chester possessed 129,493 cattle, of which 67,706 were attacked between the end of June, 1865, and the end of October, 1866, being 52·288 per cent. of the cattle of that county. During the same period the cattle attacked in the whole of England, excluding the Welsh counties, numbered 98,476, or 5·8 per cent. of the whole of its stock. Whilst great havoc occurred amongst the choice herds of several English counties, the cattle attacked in Scotland numbered 46,861,

or 4·8 per cent. of the stock of that portion of the kingdom.

In Scotland the attacks varied from 35 per cent. in one county, Forfar, to a small decimal point of 1 per cent. in other counties, both north and south of the Forth; and from 13 per cent. in Kincardine to ·244 per cent. in the adjoining county of Aberbeen; whilst, with the exception of a single attack in Inverness, the disease did not appear in any county north of Aberdeen; and eleven Scotch counties escaped its ravages.

In England the severity of the disease varied from 52 per cent. in Cheshire, and a large but not equal visitation in other counties to ·290 per cent. in the South Western division of England, whilst total immunity was enjoyed by two English and ten of the twelve Welsh counties, those alone being visited by the disease which border on Cheshire, namely, Flint and Denbigh. Some persons have attributed the immunity from the disease in portions of England, Wales, and Scotland, to the lofty and mountainous character of much of those districts. Many parts of the counties thus spared border, however, on the sea coast, and it seems a more probable conclusion that the inhabitants, being for the most part exporters of stock and rarely importers of any, the disease was never introduced within their borders, and could not infect their cattle.

The official returns notify that of the cattle attacked in Great Britain, 253,725 in number, only 33,413 recovered from the disease. What portions of that number were cured by medical treatment and what varieties of treatment were employed, do not appear in the official returns, but those gentlemen whose opinions seem entitled to the most weight think that medical remedies have proved of small or no value.

The proportion of recoveries to attacks differed largely as well between the several divisions of the kingdom, as between different counties in the same division.

Thus in England the proportion of recoveries to attacks did not quite amount to 11 per cent., and in different English counties the proportion varied from 4 per cent. in the Metropolis, 4.5 per cent. in Norfolk, 6 per cent. in Lincolnshire and Cambridgeshire, 7 per cent. in Kent and Buckinghamshire, and 8 per cent. in Suffolk, to 10 per cent. in the East and West Ridings of Yorkshire, 17 per cent. in Berks and Durham, and 17 per cent. in the North Riding.

In Scotland the difference between recoveries and attacks was still greater; for whilst in that part of the kingdom they amounted to 22 per cent., in Aberdeen the proportion of recoveries to attacks did not exceed one per cent., and in Dumfries and Haddington did not exceed eight per cent., they amounted in Edinburgh to 18, in Stirling to 22, in Dumbarton to 23, in Fife to 24, in Forfar to 25, in Perth to 26, in Kincardine to 28, in Berwick to 30, and in Clackmannan to 42 per cent.: and Aberdeen, where there were scarcely any recoveries, adjoins Kincardine, where the recoveries were numerous.

The first report of the Commissioners appointed by her Majesty to inquire into the origin and nature of the plague, made on the 31st October, 1865, contained the following passages:—"The practical conclusion at which foreign physicians and foreign governments have arrived—the conclusion that it is better always to kill a diseased animal, or a few diseased animals, where by so doing you can kill an isolated germ of disease, instead of suffering that germ to linger and fructify whilst you are attempting a cure, for the precarious prospect of an insignificant saving—is justified by reason, it is also directly justified by experience, which shows that whilst the plague propagated from a single germ speedily becomes unmanageable, spreads from herd to herd, from province to province, and from country to country, multiplies in a continually increasing ratio, and exhausts itself only after a ruinous havoc and a long course of time, it may be effectually eradicated by prompt and unsparing measures. The experience of Prussia is especially valuable in this respect. The plague has often appeared, says Professor Gerlach, in the provinces bordering on the Russian Empire in East Prussia, Posen, and Silesia, but it has never, since 1815, penetrated eastwards, even so far as Brandenburg."

Loud murmurs followed the publication of that report, and remonstrances were freely offered against the suggestion that medical science was powerless in the presence of this great calamity; and yet, after a year's further experience, the destruction of the herd in which the disease has appeared is the remedy still employed. It must not be forgotten that from the time this was authorised by the legislature the disease rapidly diminished. In fact, the policeman and the pole-axe are our only aids, the one to ensure the separation of healthy from diseased animals, the other to slaughter not only diseased animals, but also stock which has been exposed to the contagious influence of diseased animals, although the disease may not have been manifested in the stock thus exposed. In the weekly return for the 3rd inst. it is intimated that hope is entertained that it is the last that will be necessary in recording the progress of a disease which so recently as February last attacked 15,706 cattle in one week.

It seems to be now the received opinion that cattle plague may be transmitted from the ox to the sheep, but sheep are far less susceptible to

the disease than cows or other cattle of that species, and a larger proportion of sheep recover than of cattle. The returns published under the authority of the Privy Council contain the following tables in relation to sheep :—

Stock in Great Britain, in March last	22,048,281
Attacked	6,826
Killed	1,029
Dead	4,640
Recovered	1,031
Unaccounted for	63

Ireland suffered from the visitation of the cattle plague to a very inconsiderable extent, the disease having appeared only in small districts of two counties, Down and Meath; and the loss of stock in that country was limited to 50 beasts, of which 29 were diseased and 21 healthy animals which had been exposed to the infection.*

It may be thought by some of my hearers that the subject of the cattle plague has occupied more than its due share of this address. The food, and dwellings, and education of the people, are all, however, subjects to which this Society has given frequent and earnest attention, and the magnitude of the visitation of which I have been treating gives to the subject a national importance, and warrants me in extending the inquiry beyond what might otherwise be its natural limits. The actual destruction of meat has been so vast; the effect of this large destruction of food upon the breeding and rearing of cattle is so formidable; the possible return of the disease is a subject of so much apprehension; and the serious increase in price, and the scarcity of animal food from the effects of so wide-spread a malady, are so certain, that the Society could not regard the subject with indifference, and the Council, at a recent meeting, resolved :—

"That a Committee be appointed to inquire and report respecting the food of the people, especially, but not exclusively, the working classes of the people; and that, having regard to the publications of the Privy Council and other documents, which illustrate the defective amount of nutritious food available for the population at large, the said Committee do report respecting the resources which are, or might be rendered, available for the production, importation, and preservation of substances suitable for food, and for improving the methods of cooking in use among the working classes."

The Council trust that the patient and careful investigation of a very important subject may conduce to the realisation of plans whereby the food of the people may be increased in quantity, and rendered more adequate to the wants of the community, or whereby the nutritious qualities of food may be increased, and the consumption economised, so that an equal quantity may be found capable of supporting a larger number of people in health and vigour. The Council are gratified to be able to state that the Right Hon. H. A. Bruce, M.P., late Vice-President of the Committee of Council on Education, has consented to act as Chairman of the Committee which it is intended to nominate.

Rinderpest, or Cattle Plague, has not been the only disease which has largely destroyed life during the present year, inasmuch as Asiatic cholera has again visited our shores, and this has been the fourth serious outbreak by which we have suffered since the appearance of that disease in Europe. The epidemic ravaged France, Belgium, and Holland in the early portion of the year, and established itself in this country in the month of July. The matter which is regarded as the origin of choleraic disease has been diffused over England and Wales, and whilst diarrhœa has prevailed to a very large extent, deaths from cholera have been registered in every English county except Hereford and Rutland. In the last quarterly report of the Registrar General is the following passage: "It was only when that element (cholerin) was diffused by water and by the wilful neglect of hygienic precautions that the mortality became appalling." The places which have suffered chiefly from its ravages are portions of the Metropolitan districts, especially East London, portions of the North Western district, especially Lancashire and Cheshire, and portions of Hampshire, Devon, and South Wales.

From the last quarterly return from the office of the Registrar General, I make the following extracts :—"The mortality of Birkenhead, on the south side of the Mersey, was at the rate of 24 in the 1,000, while the mortality in the borough of Liverpool, on the north bank of the river, was 50. The deaths in Liverpool at the Birkenhead rate would have been about 2,906: the actual deaths were 6,091. The cholera has prevailed, as on former occasions, in particular fields. The London cholera field, by extension down the Thames, reached Ramsgate. The second considerable field lies round the Solent, along the coast from Portsmouth and Southampton to Newport and the Isle of Wight. The Exeter field extended beyond Torbay to Totness and Brixham. The Liverpool field

* Since this address was written, I have been favoured by Professor Simonds with a copy of the address delivered by him at the Royal Veterinary College, on the opening of the present session. His narrative of the appearance of the cattle plague in limited districts of two Irish counties, and the success with which it was stamped out, with the loss of twenty-nine diseased, and twenty-one healthy animals; and his contrast between France and Belgium on the one hand—the sacrifice in the former kingdom being forty-three animals, and in the latter 455 animals slaughtered to prevent the spread of the disease—and Holland on the other, where the destruction of infected animals has been wanting in promptitude, and the disease still prevails to an alarming extent, may be commended to all who regard the prevention of the cattle disease as an object of great national importance.

extended to Chester, Wigan, and Bolton, but scarcely touched Manchester. The Swansea field was visited with extreme severity, and although the mortality was concentrated mainly on Swansea, Neath, and Llanelly, it was felt all over Glamorgan, Carmarthen, and Pembroke, as far as Haverfordwest. The epidemic has been most fatal on the sea coast, in the chief ports of the kingdom. It is by no means capricious, but obeys definite laws. It never destroys the people to any extent where the water supply is pure, or where the hygienic conditions are good, when the authorities adopt judicious and well arranged measures of early treatment and systematic disinfection. Those districts which are supplied with bad water, have no effective system of sewage, have no health officer, and have no precautions in force, should immediately set their houses in order, as they are still in imminent danger."

Fears are expressed in many quarters by thoughtful men that, although the mortality from cholera has greatly diminished, and the area of its attacks is much lessened, it may be expected to re-appear before it departs from our shores; and although this opinion ought not to discourage us, we should firmly resolve not to discontinue or diminish, but, where necessary, to increase and extend those sanitary precautions whereby we have sought protection for our people in the recent crisis.

Physical agencies of a noxious character have not been confined in the present year to the animal kingdom, but the vegetable kingdom has also suffered from influences which in various modes have been found destructive to vegetables, fruit, and flowers. The potato crop has again suffered largely, and the root which forms so important a portion of human food has to no small extent been thrown away in many districts as fit only for animals. Twenty years have now elapsed since the potato crop failed largely for the first time, and the disease has reappeared year by year since that time with a destructive effect varying in intensity. The science of horticulture has hitherto been powerless to avert the evil from our fields and gardens, but I may express an expectation that our added experience and increased knowledge of vegetable life may discover some means whereby this valuable crop may be protected from the destruction with which it is now so often visited.

Amongst the sanitary agencies to which I have alluded, improved dwellings for the people, properly drained and well ventilated, are of primary importance.

The report of the second Special Committee appointed by this Society to inquire into the subject appeared in the *Journal* of May 12th, 1865, and the subject was brought under the notice of the Society in the address of my predecessor, who presided over the deliberations of that Committee, devoting to the important subject for which it was appointed much time and attention, and it was again submitted to the consideration of the Society in the report made to them by the Council at the Annual General Meeting on the 27th June last. The members were then informed that a Bill had been prepared by a joint committee of this Society and of the Association for the Promotion of Social Science, by which powers were proposed to be conferred on certain bodies to acquire compulsorily property which had become unhealthy or was found a nuisance to the neighbourhood, and to erect thereon improved dwellings suitable for the working classes. The Bill so prepared will receive the careful consideration of the Council.

Our country has suffered many calamities, physical, social, and commercial, during the year now hurrying to its close, whilst famine, fire, and tempest have visited portions of the colonies and dependencies of the Crown; and on the Continent of Europe war has brought about political changes of great magnitude. Amidst, however, those saddening thoughts which arise from political convulsions and natural or social calamities, the future historian, when he chronicles the events of 1866, will be able to point to the completion of the Atlantic Telegraph as one of the greatest—if not the greatest—works of our age, and one of the most remarkable triumphs of man over nature which science has yet accomplished. This achievement is England's contribution, in the present year, to the service of mankind; and, although the importance of ocean telegraphy can scarcely yet be estimated, we may feel proud of a people whose genius, enterprise, and perseverance has thus linked together the Old and the New Worlds. The communication established between this country and America will, in a few years, extend over the globe; and the names of the men, by whom the work was undertaken and accomplished, will be remembered with honour throughout the world.

It is our earnest hope that our closer relation to the United States, whilst it must largely contribute to the extension of our trade with each other, may also preserve in amity two countries between whom peace and good-will ought to prevail. Whilst united they will be all powerful, and on their union must largely depend the future of mankind.

It is remarkable how the difficulties which it was supposed would embarrass the satisfactory working of the Atlantic telegraph have rapidly disappeared under the teachings of experience. Many years have not passed away since we were assured by a man of great scientific reputation

that no steamship could navigate between England and America: and we were recently told by many persons that the distance between Ireland and Newfoundland, and the submersion of a cable on the bed of the Atlantic, would be found formidable obstructions to the working of the telegraph. Steamships, however, have navigated the Atlantic, notwithstanding the objections once raised to the enterprise, and the telegraph has done its work on the bed of the ocean without interruption.

It will be satisfactory to the Society to reflect that the labours of Cooke and Wheatstone in the introduction of telegraphy into this country, secured in this room due acknowledgment, and that submarine telegraphy formed the subject of a course of lectures delivered here last year by Mr. Fleeming Jenkin, characterised by much ability.

The Albert gold medal, awarded for distinguished services in promoting Arts, Manufactures, and Commerce, is the greatest distinction the Society is enabled to confer, and this year, when it was bestowed for the third time, it was unanimously awarded by the Council, with the cordial approval of his Royal Highness, the President, to Michael Faraday, for discoveries in electricity, magnetism, and chemistry, which, in their application to the industries of the world, have so largely promoted arts, manufactures, and commerce. Unselfish in disposition, scrupulously delicate in his judgments, distinguished above nearly all the men of his time for physical discovery, a philosopher of the very highest reputation, the Society can hardly be said to have conferred a distinction on one whose merits are recognized in the world of science, and whose labours and discoveries have for nearly half a century contributed so much to advance material progress.

Unhappily the health of Professor Faraday would not permit his attendance at a general meeting of the Society, and I had the honour to be present on the 16th of June last when our late Chairman, Mr. Hawes, accompanied by the Secretary, waited upon the Professor at his request at his residence, and presented to him the Albert gold medal. He then acknowledged with grateful feelings his sense of the recognition by the Society of his services to arts and science.

The members will recall the International Horticultural Exhibition and Botanical Congress which was held at South Kensington in the last summer with much success. This Society being requested by the promoters of that Exhibition to aid the undertaking, offered a sum of £50 in prizes for implements connected with the advancement of horticulture, which the Council were advised would be the best encouragement they could offer to that important undertaking; and members will have seen by the *Journal* that several of the prizes have been awarded.

The Cantor Lectures may now be regarded as a branch of the Society's ordinary proceedings, and the members and their friends have been attracted in large numbers on the evenings devoted to those lectures. For the ensuing session the Council are happy to announce that they have secured the services of Mr. Hullah, who has consented to deliver a course on music, which, coming from one to whom the progress of music in this country owes so much, will no doubt excite a large amount of interest.

Mr. Chaffers, whose complete acquaintance with the subject is so generally acknowledged, has undertaken to deliver a course upon pottery and porcelain; and considering how largely a taste for this branch of art manufacture has advanced of late years, these lectures will doubtless engage the attention of a considerable number of our members. Arrangements are intended to be made for a third course, which will probably include some branch of chemical science affecting Arts and Manufactures.

The bequest of Dr. Cantor, employed in securing the services of lecturers eminent in their respective walks on subjects which interest a large number of our members, has been made an agency of much usefulness, and the audiences have been familiarized with subjects which, although abstruse in themselves, were presented to their understandings in lucid language, and with much felicity of illustration.

The papers that have been announced as to be read before the Society at the Wednesday Evening Meetings previous to Christmas appear to be of a very interesting character.

The Council desire to express their public and grateful acknowledgments to the Board of Examiners, by whose labours the yearly examinations of the Candidates for the Society's Certificates and Prizes have been conducted with results of an eminently satisfactory character; and also to those Committees which, at the request of the Council, have undertaken important investigations, and enabled the Council to achieve results which would otherwise have been unattainable.

In former addresses from this place the hope has been expressed that we shall year by year witness an addition to the number of those members, who, by contributions to the Society's *Journal*, or to the papers read and the discussions conducted at our weekly meetings, will increase the usefulness and extend the influence of a Society which includes many agencies for promoting the well-being of the community. The meeting of to-day forms our 113th Anniversary, and in an active career, extending over more than a century, the Society has witnessed many vicissitudes. Some of our original functions have been undertaken by kindred societies, but this is the only chartered body

which strives to promote Manufactures and Commerce by the employment in their service of Science and Art. May I venture to impress upon our members that the importance of Arts, Manufactures, and Commerce is not to be measured by the wealth they create or the enjoyments they diffuse. Their advantages must in the end be estimated by the ameliorations they effect in the social and moral condition of the community to whose physical comforts they may have contributed. The great end of our being is the elevation to a better and higher standard of the race to which we belong, and science is only truly valuable when it adds to the moral dignity of man. Increased influence brings with it increased responsibilities; and we shall be judged hereafter not by the extent of our resources, but by the purposes for which our means of usefulness have been employed. Let no man excuse himself on the plea that neither his position nor his abilities qualify him for performing important services, for to such a one we may apply the language of a great poet and good man :—

> The primal duties shine aloft, like stars;
> The charities that soothe, and heal, and bless,
> Are scattered at the feet of men like flowers;
> The generous inclination, the just rule,
> Kind wishes, and good actions, and pure thoughts.
> No mystery is here! Here is no boon
> For high, yet not for low; for proudly grand,
> Yet not for meek of heart.

Mr. Harry Chester said he was quite sure the members would be very sorry to separate without returning their cordial thanks to the chairman for the very admirable address he had delivered to them. There was a time when it was not thought to be etiquette in this Society to thank the chairman on these occasions, but that feeling had given way of late years to a warmer and indeed to a more common-sense feeling, and they had generally been in the habit of voting their thanks to the chairman for the great trouble he must necessarily have taken in preparing the address at the opening of the Session. If ever there was an occasion on which such a tribute was due, it was the present, when they had been favoured with an address which was full of most valuable matter and had been listened to with the greatest interest and profit. When published he was quite sure this address would be read with pleasure by the members of the Society who had not had the opportunity of hearing it. He begged to propose a cordial vote of thanks to Sir Thomas Phillips for the address he had delivered.

The motion having been seconded by Mr. W. S. Rumsey, was carried by acclamation.

Sir Thomas Phillips thanked the meeting very much for the kind way in which they had received his endeavours to discharge a duty which, though not of an unpleasant kind, was certainly rather laborious. He had done his best, and he thanked them for having received that best in so kind a manner.

PARIS EXHIBITION, 1867.

Every week, almost every day, now produces a noticeable change in the Champ de Mars. The building is finished as regards its main parts, and all the minor portions of the work are advancing rapidly. A very considerable portion of the glazing is executed; the fine art courts are all but finished in this respect, as are the intermediate galleries, or courts, for raw materials and manufactured articles, and the glass is being placed in the immense double range of windows which occupy the whole of the upper portion of the walls of the great machinery and processes court. As regards painting, considerable progress has been made; nearly all the iron work has received two coats of colour, but there is at present some doubt as to the manner in which the decoration is to be completed. It was originally intended, we believe, that the whole should be in chocolate colour, relieved by lines of gold, and here and there with colour, but the extremely heavy appearance of the outer iron walls and of the interior of the grand machinery court seems to have caused some hesitation; small portions have been painted experimentally of a light coffee colour with lines of positive colour. It does not appear, however, that the specimens produced have given satisfaction. In fact, it seems almost hopeless to do anything more with such an enormous mass of ironwork as the interior presents than to colour the whole surface with one or, at any rate, two neutral tints. Its size, nearly a mile round, and more than eighty feet high, renders ornamentation almost impossible. A few days since a Commission was on the ground to judge of the effect of several turret-like ornaments placed as caps on the great square pillars of the outer circle, and of some coloured escutcheons hung on the faces of the pillars, level with the arched roof, but the effect could scarcely be considered satisfactory.

The workmen are now engaged in finishing the structure of the main vestibule and avenue which extend from the principal entrance of the building to the inner garden. The roof of this avenue has been carried nearly up level with the springing of the roof of the great machine court, and, like it, is lighted by clerestory windows on each side. The façade of this avenue in the central garden consists of a colonnade of three arcades with a large semicircular window above, and the whole is connected with the verandah which encircles the garden. The verandah itself is finished, and has a fine effect, although the painting is not yet done; it consists of a wooden roof, which will be coloured in panels, supported by light iron columns on bold plinths, and with a façia relieved by curves at intervals; the wall at the back will also be painted in panels.

The fine art galleries which lie around the minor garden are being floored partly with cement and partly with parquetry. The walls are plastered here and there with olive and other neutral tints by way of experiment. Light frames covered with white calico are also being suspended from the tie rods of the roof to form a semi-transparent ceiling along the centre of the galleries, a system adopted recently with good effect at the annual exhibitions of pictures in Paris.

In the great machine court, foundations and other preparations are being made here and there. The outer ring of the building, the alimentary court, with its broad verandah, or piazza giving on the park, will very shortly be finished, and already one celebrated confectioner has the front of his future shop in place, with his name over it in conspicuous letters. When this circle is thus filled in all round, the heaviness of the outside, now so much noticed, will, to a great extent, disappear.

The grounds, or *parc*, have undergone a great change within a week or two; buildings of every kind are growing up with extraordinary rapidity. The most conspicuous and the most forward are the picture gallery and machinery rotunda of Belgium, and the temple and other buildings belonging to Egypt. The largest of these, the Temple of Hothar, is finished as regards the outer walls, and, surrounded by its antique colonnade, forms a very conspicuous object.

The model church for the exhibition of French ecclesiastical decorations and church furniture, utensils, and ornaments, forms now a very pretty object with its

numerous windows, elegant ornamental tiled roofs, and brackets, with niches for sculpture. The large lake near at hand, with its massive rockwork, is ready to receive the water, and the iron framework for the electric light-house is now being placed on the rock. A wooden dioptric light-house, of the ordinary kind, stands at a short distance from this spot.

In another corner of the grounds the International Club-house is approaching completion, and on each side of this building are arcades, each having three ranges of small shops, two within and one on the outer side.

On the French side of the park is a long range of lofty sheds for the exhibition of carriages, and others for the accommodation of those visiting the Exhibition. A large building belonging to the General Society of Bakers; a three-story model lodging-house, erected by the Associated Masons of Paris; and several other buildings, some of considerable size are in progress; and the Imperial Pavilion is nearly finished as regards its shell.

The twelve engine and boiler-houses, with their chimney shafts, will shortly be finished, and they already form very ornamental features in the grounds, being constructed of many coloured bricks, and with great taste.

The corner of the park devoted to the horticultural exhibition is at present in an exceedingly rough condition, but the main works are approaching completion. The rock-work caves and chief earthworks are nearly finished, and over the former are being placed a series of iron joists, which will support the glass floor of the aquariums, which will be visible from below as well as above.

The pathways and flower beds in a large portion of the grounds are laid out, and in many parts the bronzed lamp posts, by means of which the park is to be illuminated, are in place, with their lamps complete. Generally, the works belonging to the French department, out of doors, are in a very forward state, and many foreign flags are flying in various parts of the ground, but neither England nor any other of the great powers have yet made their appearance.

Amongst the buildings in the garden not mentioned above, are model candle works, a crèche, or public nursery, a patent furniture factory, a model glass house, chocolate establishment, a building erected for the Industrial Society of Mulhouse, and a chalet for the society for the protection of animals.

An extremely important work is being carried out on the summit of the hill of the Trocadero, on the opposite side of the river to the Champ de Mars, namely, a reservoir for the supply of water power for the purposes of the exhibition; this reservoir will contain 4,000 cubic mètres, and is more than a hundred feet above the level of the Seine; the water will be pumped up into it from the river, and will descend through pipes laid across the bridge of Jena to the exhibition grounds to supply the fountains and cascades, and any water power that may be required.

Amongst the noticeable contributions promised is a series of models and charts, prepared by order of the Isthmus of Suez Company, exhibiting not only accurate representations of the great work in which they are engaged, but also of the machinery and other means employed in its execution.

The lists of exhibitors are being finally revised, and those of a large number of classes have been printed. Amongst the most recent is that of the printers and publishers, a long list, including nearly all the great houses in Paris, and many of the famous provincial firms of Tours and other places. The book trade of France will certainly be well represented.

The Imperial government has issued a notice to artists desiring to have their pictures admitted to the exhibition, that if such works are the property of the government and are in any of the public galleries or establishments belonging to the state, applications for their admission will be immediately considered and decided on; with respect to works which have been presented to local museums by the government, the artists will have to apply to the provincial authorities. The election of the jury of admission for works of fine art has been deferred, and in consequence of the academy having refused to take part in the election, two-thirds are to be elected by the body of decorated artists and medalists.

The promises which arrive from abroad include some important items. The Austrian Government has ordered to be erected in the park a group of buildings representing the various methods of construction in use amongst the different races which compose the Austrian empire. Not only the buildings themselves, but their fittings, furniture and decorations, will all be the work of native artists and workmen. In connection with these buildings will be a gallery, in which will be established an Austrian restaurant, in which the various viands and drinks in use in the empire will be served by persons dressed in their national costume.

Italy promises a fine collection of furniture, decorated with the beautiful inlaid and mosaic work in wood and hard stones for which several of the cities of that kingdom are renowned, besides many other articles of artistic manufacture.

Germany will be divided into two groups, the Union of the North, to include Prussia, Brunswick, Saxony, Saxe Altenbourg, Saxe Meiningen, Saxe Coburg, Schwartzbourg, Waldeck, Anhalt, Oldenburg, Bremen, Mecklenburg-Schwerin; and the Union of the South, Bavaria, Wurtemburg, Baden, and Hesse Darmstadt. Amongst the promised contributions are specimens of the work of the great gun factory of Messrs. Krupp, of Essen; a gigantic cannon in cast steel is said to be ready; this huge arm weighs 17½ tons, and throws elongated cast steel projectiles weighing half a ton each, the charge required being 60 lbs. of powder.

The Swedish Government, amongst other remarkable objects, will exhibit a complete reproduction of the house occupied by Gustavus Vasa at Ornacs, in Delacarlia; this curiosity, which is now on view at Stockholm, will represent the ancient architecture of Sweden, together with the fittings and furniture of the time.

Belgium has exhibited great alacrity in her preparations, and will no doubt make an admirable exhibition; the Count of Flanders, brother of the King, and President of the Exhibition Commission, has taken one wing of the Grand Hotel at Paris for several months.

The Oriental nations will, if they fulfil their promises, make a much greater show next year than at any previous exhibition. There seems to have been great doubt whether the Persian Government would move in the matter, but the Persian Minister in Paris, General Hassan Ali Khan, has despatched an officer of the legation to press upon the Government the policy of sending a complete collection of the industrial and artistic products of the country to the Exhibition.

The delegates of many of the classes of French industry have resolved to secure themselves against robbery by means of attendants paid by the whole body of exhibitors in each class, but the jewellers, considering the great value of their contributions, have obtained the promised attendance of two police officers, who will watch day and night over that section of the Exhibition, and the sum of 2,000 francs has been devoted for that exceptional service.

Manufactures.

Self-fastening Buttons.—In the *Journal* of the 2nd inst. (p. 762) there appeared a description of a self-fastening button, invented by Mr. Hart. It may be mentioned that Mr. George Bussey has also patented a button, fastened by a rivet, which has a flange at the back, and is fixed by a blow of a set-punch and mallet in front. An advantage specially claimed by the in-

ventor is that the flange at the back, being smooth, is not likely to wear the clothing by friction. A correspondent has also favoured us by sending a button which he "purchased in France about six years ago," and which is fastened by shanks turned down at the back.

Commerce.

Our Trade with the East and West.—The *Produce Markets' Review* says:—Whenever a derangement is apparent in the movements of the money market, and coin becomes gradually scarcer in the general circulation, the circumstance—in default of any more satisfactory explanation—is usually referred to the drain of bullion to the East. The terms of this stereotyped phrase are too vague to show its significance, and it is not at first sight so obvious why the demand should assume such a character as to be designated by so exhaustive a name, and why it should always be to the east and never to the west. A reference to the official returns for the year 1864, the latest period for which we have complete and reliable calculations, will at once show the different nature of our commerce with the Eastern nations and with those of the West, including under this name the United States, our North American Colonies, Brazil, and Australia. According then to the Government returns, it appears that the value of our imports from Egypt, India, and China, in that year was rather more than £87,000,000, whilst the value of our exports in the same period to those countries amounted to only £34,000,000, thus leaving a balance of £53,000,000, which amount would principally require to be paid in bullion. It is evident, then, that in our commerce with the East—taking the year in question as an average by which to determine the rest—that for every one hundred pounds' worth of goods imported from the East we can barter in exchange only sixty pounds' worth of goods, and must pay the remaining forty almost in cash. Our trade with the West shows a very different result. The value of our imports during the year 1864, from the United States, North American Colonies, Brazil, and Australia, amounted to £42,000,000, whilst our exports reached 46,000,000, showing a balance of 4,000,000 in favour of England. So far, then, as any interchange of commodities takes place between England and the West, it appears that the producing powers of the Western countries is at present insufficient, and they are consequently driven to equalise the balance of trade with money payments. We arrive at a similar result, though not precisely identical with respect to the exact figures, by comparing our exports and imports of bullion from the countries that we have included under the head of West; for whilst our imports of gold and silver amounted to more than £10,000,000, our exports were within £2,000,000. The means of paying for these large imports are of course given by the gold and silver mines of the New World and of Australia, and it is certainly a wonderful fact that the precious deposits should have been placed in the exact spots to foster the growth of new communities, which without their aid would have been unable to pay for the articles necessary to an advanced civilisation, and which without the mines would have either had no inducement to colonise, or if they did colonise would have had to retrograde in civilisation, and go back to a state of nature. If we pursue our inquiries still further, and ask why it is that in the one case our coin appears to be so wholly absorbed, and there is no return trade to answer to our own, the reason will be found in the social habits and mental condition of the East. To assimilate our eastern trade to that which we carry on with the West, we must, first of all, indoctrinate the East with our own advanced civilisation, and convince them that real wealth consists not in the amount of coin and jewellery amassed, but in the producing power of the country, the energy and intelligence of the inhabitants. A task such as this, it would require ages to accomplish; and in the meantime it will be our duty to palliate, as far as lies in our power, the evil which we are powerless to prevent—the absorption of our gold and silver bullion by the East; and it is to be hoped that the Legislature will before long find the means of effecting this, without having recourse to the absurd expedient of temporarily extinguishing trade. In the meantime, it is a good sign that the Commission appointed by the Indian Government to inquire into the subject of the currency have recommended the immediate introduction of a gold coinage into India. This, with an extension of the present imperfect note-system, will increase the rapidity of the circulation, and thus tend to diminish the demand for bullion.

Colonies.

Australia and the Financial Crisis.—A merchant's private circular, dated Melbourne, 26th September, says:—"We reported last month that, in consequence of the financial crisis in London, the banks here had been compelled to adopt a stringent policy. This has now been in operation simultaneously in all the Australian colonies for nearly two months, and at a season of the year when both the industrial and trading classes have usually needed and received considerable advances from the banks. It is highly satisfactory to find that this pressure has produced much less disaster than might have been expected. In Sydney and Adelaide it has been severely felt; failures continue, and confidence is affected, though, happily, not as yet to a serious extent. But in Melbourne the community have passed through the ordeal comparatively unscathed. During the past month there has not been a failure of any moment, and at no time has the community been considered sounder than at present. But though there has been comparatively little actual loss, the pressure has had a most prejudicial effect on trade. For several months previous to the opening of the wool season (in October), there is always a great stagnation, which has this year been intensified by the want of the usual accommodation from the banks. Not only have dealers, in consequence, confined their purchases to actual daily wants, but buildings and industrial operations of various kinds have been suspended. From this cause there has been a scarcity of employment for the working classes, and at the same time several articles of first necessity have been unusually dear. This has, of course, reacted on the demand for imports. In addition to these untoward circumstances, some branches of trade have suffered from the overtrading mentioned in our last. As usual, the result has been large sacrifices at auction, which has injured the legitimate merchant. While trade has been thus severely depressed, the holders of goods are not without hope of an improvement. The crisis in London has had the one good effect of checking overshipments, and in this respect the last advices are satisfactory. Again, the local causes of pressure may be said to have reached their climax. Should the wool season prove early, and of this there is good hope, the improvements may be speedy and effectual. The average production of wool alone in Victoria is now valued at three millions sterling, and as the capitalists of Victoria have made large investments in stations in the neighbouring colonies, the amount receivable from this source considerably exceeds the above amount. As regards the crops, the anticipations are equally favourable. Every vestige of drought has disappeared, the season is most propitious, and from all parts of the country the most satisfactory accounts have been received, both as regards the extent of cultivation and the appearance of the crops."

Emigration.—According to the quarterly return published by the Registrar-General, it appears that during the quarter ended 30th September, the total number of emigrants from the United Kingdom was 47,153, an increase over the number during the same period of the preceding year. Of these about 7,000 went to the Australasian colonies, 4,000 to the North American colonies, and 36,000 (mostly Irish) to the United States.

Notes.

A New Substitute for Collodion.—M. Persoz, Fils, has recently discovered a method for obtaining a material possessing the same characteristic qualities as collodion. *La Lumiere* says:—This new substance is produced by dissolving silk in a suitable solvent, and then separating the latter by means of dialysis. If the film be of a certain degree of thickness, it assumes on drying a golden tint, but this would no doubt be scarcely perceptible in a thin film, such as would be used in photography. The solvent chosen by M. Persoz is chloride of zinc, which, when kept at a warm temperature, readily dissolves the silk, but if the solvent be not warmed the silk takes a much longer time to dissolve. Before employing the chloride of zinc, it is heated with a small quantity of oxide of zinc, in order to neutralise any excess of acid in the chloride, and then filtered through a piece of fine cambric to remove the superabundant oxide. To separate the chloride of zinc from the solution of silk, M. Persoz has recourse to Professor Graham's method of dialysis. The apparatus for dialysis, which is a kind of sieve, is made by means of a broad strip of gutta-percha, bent round and cemented in the form of a cylinder, at one end of which is fixed a disc of parchment to form the bottom. The apparatus is floated upon a vessel of water, and the silk solution, previously diluted with water to the consistency of collodion, is poured into it. The chloride of zinc percolates through the moistened disc of parchment, and mixes with the water in which the apparatus is floating. In a few days the whole of the chloride of zinc will be found to have become separated from the silk solution, but the presence of a slight quantity of the chloride in the material is of no great consequence, as it merely gives rise to the formation, in the sensitive film, of a minute quantity of chloride of silver. Although M. Persoz does not mention the fact, there is no doubt that a dry film of this substance would be quite insoluble in water. Its employment is very simple. It is first iodised by mixing with it an aqueous solution of iodide, and then dried and sensitised; the exposure and development are conducted in the ordinary manner.

Tissue Paper as a Substitute for Lint.—The surgeons of Vienna have employed, with much success, the white unsized paper known as Papier Joseph, for dressing wounds. It has all the properties of lint, and in towns it may be obtained in large quantities at a very low price. In every way it has all the advantages of lint; it does not change in contact with water; it is a bad conductor of heat, and preserves, in consequence, the wounds from atmospheric influence. From its absorbent nature, it sucks up the matter, maintains the wounds in a state of dryness favourable to healing, and it may be used in certain circumstances more advantageously even than lint.

University Education in Spain.—The following royal decree has recently been published in Spain:—"Art. 1st. A Faculty of Sciences shall be established in the Central University, comprising a complete course of instruction up to the degree of doctor inclusively. The courses of the exact sciences, of physics and chemistry, natural history and astronomical observations, will constitute this faculty according to the provisions of the law on public instruction, published the 9th September, 1857. Art. 2nd. The Faculty of Sciences will comprise two sections: that of physical science, mathematics, and chemistry, and that of the natural sciences. The studies will be the same for each up to the degree of bachelor."

Pears.—In Covent Garden market this week there have been exposed for sale some large pears (*Belle angevine*), ticketed eighteen guineas a dozen.

Correspondence.

The Condition of the Tea Trade.—Sir,—In your *Journal* of the 9th instant appear some remarks under this heading, but as the subject, perhaps, is not one of very great general interest, I should hesitate to trouble you with any observations of mine, were it not for the importance of accuracy of statement in everything appearing in the columns of our *Journal*. The larger portion of the strictures of the writer refer to matters of detail, and are also of an imaginary character; these I shall therefore dismiss with this remark—that those engaged in any trade ought to be the best judges of its details and method of working. I now come to the grand charge of "disorganisation;" this is, indeed, a grave statement, and as it is held to be an impossibility to prove a negative, I must battle with it as best I can; and first of all I would say, the trade are unaware of the fact; but possibly it may be replied, a disorganised body is necessarily unaware of its own condition; but as a disorganised body cannot continue to perform its functions, perhaps the inquiry as to whether the tea trade is doing this may meet the case; and I would with confidence appeal to all the ladies of the land for a verdict in my favour; and I feel certain that—whether it were the lady who calls in her carriage at Messrs. Twining's, in the Strand, or the heroine of the washtub in the remotest village, getting her ounce of tea from the nearest shop—the answer would be, that the supply was both good and cheap. The trade, therefore, cannot be disorganised while the import is larger, and the distribution of the article through the country more active than ever. It does, however, happen that a good deal of tea is being sold at a heavy loss, but this is owing chiefly to too great competition in China, and partly to the depression which the tea market has suffered, in common with every other, from the late panic, the recovery from which is retarded by the growing conviction in mercantile circles of the inadequacy of our currency to our greatly-increased trade since 1844, and the consequent liability to sudden oscillations and high rates of interest, with all their ruinous consequences.—I am, &c., H. C. White, Tea Broker.

London, Nov. 20.

Artificial Quinine.—Sir,—In the report of one of Mr. Crace Calvert's (Cantor) lectures, which appeared in a late number of the *Journal*, the hope is expressed that quinine and other costly and valuable organic principles may "one day" be produced or built up artificially in the laboratory. Will you permit me to state that quinine was first produced synthetically by me in the month of October, 1865, and small specimens of this artificial quinine were deposited with the Secretary of the Society of Arts and Dr. B. W. Richardson just twelve months ago. In the *Social Science Review* for December, 1865, I announced the discovery for the first time, and my artificial quinine was exhibited at Nottingham this year at the Pharmaceutical Conference, and at the *soirées* of the British Association. Thus much in justice to myself. For the rest, I must confess that at the present moment (the inquiry having been laid aside for some months past owing to the pressure of other matters), I only possess a very few grains of the substance as the result of two years' labour and considerable outlay; but I see no reason to suppose that a ton of artificial quinine will not be eventually produced at a cost not exceeding the present price of half-a-hundred-

weight of the principle now extracted from the bark of *cinchona*.—I am, &c, Wentworth Lascelles Scott, F.C.S., &c.

Wolverhampton, Nov. 19th.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...R. Geographical, 8½. 1. Letter of Dr. Livingston from the Rovuma River. 2. Dr. J. R. Mann, "On the Physical Geography of Natal."

Institute of Actuaries, 7. Mr. T. B. Sprague, "On the value of Annuities payable half-yearly and quarterly, &c."

Tues. ...Civil Engineers, 8. 1. Mr. J. Llewellyn Morgan, "On the Smelting of Copper Ores, with wood as fuel, in Australia." 2. Mr. T. Dawson Ridley, "Description of the Cofferdams used in the execution of No. 2 Contract of the Thames Embankment."

Wed. ...Society of Arts, 8. Mr. W. Hawes, "On the Effect of Limited Liability Partnership on the Progress of Arts, Manufactures, and Commerce."

Patents.

From Commissioners of Patents' Journal, November 16th.

Grants of Provisional Protection.

Armour plates, fastenings for—2821—H. H. Williams.
Atmospheric engines—2590—W. E. Newton.
Baling bands, fastenings for—2726—A. V. Newton.
Beer casks, tapping—2666—W. R. Lake.
Blue colouring matters—2686—C. A. Girard.
Bolt-making machine—2636—H. J. Cooke.
Bottles—2572—W. Dennis.
Braiding machines—2694—R. Furnival.
Breech-loading fire arms, and bayonets for—2642—A. Wyley.
Breech-loading fire-arms, and cartridges—2813—G. H. Daw and P. M. Parsons.
Breech-loading fire-arms, and cartridges for—2580—J. von der Poppenburg.
Brickmaking machines—2594—G. T. Bousfield.
Buttons—2781—G. A. Huddart.
Candles—2658—F. Meyer, W. Wainwright, jun., and T. P. Pascoe.
Candles—2732—A. Field.
Caps—2584—M. Star.
Carriage indicators—2597—J. Monnin, and C. Bosc, C. A. Boissenot.
Coal-mining machinery—2708—C. Jones.
Cooking apparatus—2560—G. Underwood.
Coughs, cure of—2783—J. and E. Blackman.
Crochet needles—2576—J. Burgess.
Dry substances, reducing—2799—H. Wedekind.
Earthy matters, washing—2736—G. Wethered.
Electric telegraph apparatus—2716—W. Clark.
Excrement, deodorizing—2750—F. Taylor.
Fabrics, finishing—2664—D. Gilson.
Fabrics, sulphuring—2656—J. and J. G. Dale.
Fibres, combing—2746—C. E. Brooman.
Fibrous materials, cleaning—2626—R. E. Lazenby.
Fibrous substances, combing—2644—J. Pollard, T. and J. Whitehead, and V. Williamson.
Fibrous substances, preparing—2562—J. Ferrabee.
Fibrous substances, separating—2564—F. W. Keselowsky.
Fire arms, breech-loading—2652—A. Albini, and F. A. Braendlin.
Floor cloths—2712—J. H. Kidd and J. C. Mather.
Furnaces—2586—J. Robertson.
Furnaces—2744—J. Watts.
Furnaces, consuming smoke in—2738—W. Harrison.
Gas, carburetting—2558—D. H. Saul and H. P. Armstrong.
Hansom cabs—2570—W. H. P. Gore.
Hats—2777—B. Tueski.
Hats—2787—J. Gee.
Hats—2789—J. E. Ward.
Hoisting apparatus—2578—W. Clark.
Jewellery—2554—G. E. Searle.
Ladies' dresses, distending—2742—E. Mignot.
Lamp glasses—2823—W. Clark.
Lathes—2801—G. Dacre.
Metallic brushes—2817—T. Welton.
Metallic pipes—2734—R. Hollingdrake.
Metal, rounding, &c.—2714—O. L. Hopson and H. Brooks.
Metal rollers—2807—A. Fairbairn, T. S. Kennedy, and J. W. Naylor.
Mining—2797—J. Hunter.
Motive power—2809—M. P. W. Boulton.
Nails, tacks, and pins—2660—J. Giles.
Needles, papering—2638—D. Evans.
Oil cake, reducing—2748—H. S. Coleman and A. G. E. Morton.
Organic iodides—2791—J. H. Johnson.
Paper—2728—J. H. Johnson.
Petroleum, storing—2760—C. E. Brooman.
Pianofortes—2588—B. C. Newell.
Pins, nails, or tacks—2706—C. E. Brooman.
Piston-valves, packing for—2684—J. Coates.
Ploughs—2754—B. J. B. Mills.
Portable chambers—2722—T. Booth.
Power looms—2710—E. B. Bigelow.
Printing machines—2803—C. H. Gardner and J. Bickerton.
Provision safes—2632—W. Watson.
Railways, signalling apparatus for—2752—W. Denton, J. Whitaker, and E. Brooke.
Reflectors—2674—A. V. Newton.
Self-acting lubricators—2680—H. Kessler.
Self-acting mules—2815—J. Dodd.
Sewing machines—2630—A. V. Newton.
Sewing machines—2785—M. and A. D. Hopkins.
Ships of war—2692—C. Chapman.
Ships, propelling—2724—J. H. Johnson.
Silk, spinning—2640—E. T. Hughes.
Spinning and doubling—2702—J. C. Brentnall and R. Edge.
Steam boilers—2720—J. G. Tongue.
Steam boilers—2805—W. E. Newton.
Steam boilers, preventing explosions in—2634—I. M. Evans.
Steam engines—2566—J. C. Chapman.
Steam engines, oscillating—2574—S. Deacon.
Steel—2568—W. G. Valentin and G. H. Benson.
Steel and iron scrap, utilizing—2819—W. Clay and A. Bowater.
Substances, separating—2696—N. Grew and G. H. Money.
Surfaces, engraving on—2570—H. Garside.
Syphons—2556—J. A. Coffey.
Taps—2672—J. Smith and J. J. Rowe.
Tube and bar cutters—2552—J. Wolstenholme and T. Pendlebury.
Type-setting machines—2704—G. Davies.
Vegetable fibres, preparing—2698—W. Simpson.
Vessels of war—2676—R. Napier.
Wax tapers—2730—J. J. Lane.
Wearing apparel—2751—W. Calvert.
Weaving, looms for—2628—D. Crichton, W. Donbavand, and D. Crichton.
Weaving, looms for—2648—T. Sagar and T. Richmond.
Weaving, looms for—2650—L. R. Bodmer.
Weaving, looms for—2654—W. Rossiter.
Weaving, looms for—2682—R. L. Hattersley and J. Smith.
Windows, fastening for—2582—J. H. Roberts.
Yarns, finishing—2668—J. Blain.

Inventions with Complete Specifications Filed.

Bedsteads—2974—J. P. Brown.
Boot and shoe heels, revolving—2916—C. D. Norton.
Calcareous stones, producing pictures on—2900—G. Haseltine.
Harbours, &c., excavating—2931—H. A. Bonneville.
Lace fabrics—2945—W. G. Swinnock.
Manure—2926—H. A. Bonneville.
Pumping or ventilating apparatus—2927—H. A. Bonneville.
Railway carriages, brakes for—2898—G. Haseltine.
Sorters—2930—H. A. Bonneville.
Submarine telegraphy—2932—G. Little.
Ventilators—2915—J. T. Kershaw.

Patents Sealed.

1218. F. Jenkin.
1398. J. Hampton.
1399. T. H. P. Dennis.
1400. C. Chapman.
1403. J. Thomas and A. Prince.
1409. P. J. Morand.
1417. G. V. Fosbery.
1418. J. Brown.
1422. M. Semple.
1423. N. Walton.
1428. A. Casse.
1429. W. Gadd and J. Moore.
1477. C. T. Hill.
1513. W. Clark.
1551. E. Farmar.
1556. W. E. Newton.
1573. W. E. Newton.
2011. C. and J. Pratt.
2408. H. S. Cropper.

From Commissioners of Patents' Journal, November 20th.

Patents Sealed.

1433. A. Crichton.
1437. C. P. Coles.
1451. S. Douglas.
1457. T. Green.
1459. J. W. Evans.
1466. J. T. King.
1467. E. Bevan and A. Fleming.
1469. G. F. Goransson.
1473. C. McFarland.
1474. J. G. Rollins.
1475. D. Thomson and W. Porter.
1487. G. Davies.
1496. I. Delcambre.
1501. W. R. Pape.
1521. J. H. Johnson.
1522. J. H. Johnson.
1525. H. E. Newton.
1528. J. Clyne.
1545. J. B. Fenby.
1554. J. H. Johnson.
1569. J. G. Tongue.
1613. J. J. and E. Harrison.
1700. W. Buckley and L. Smith.
1750. H. A. Bonneville.
1964. T. Greenwood & W. Keats.
1994. J. T. H. Richardson.
2304. C. E. Brooman.
2393. W. R. Lake.

Patents on which the Stamp Duty of £50 has been Paid.

2867. E. W. Elmslie.
2896. W. B. Adams.
2970. D. Kirkaldy.
2838. M. A. Muir & J. McIlwham.
2845. E. T. Hughes.
2853. G. Lindemann.
3038. C. Cammell & W. Crompton.
3100. W. L. and T. Winans.
2863. E. and F. A. Leigh.
2897. J. Eglin.
2912. G. Rait and J. Winsborrow.
2876. P. M. Parsons.
2878. W. Cowan.
2915. B. Dobson, E. Barlow, and P. Knowles.
2904. E. Walker.
2910. J. Colling & D. G. Pinkney.
2936. F. Watkins.
2960. J. Sibert.
2962. C. L. Daboll.

Patents on which the Stamp Duty of £100 has been Paid.

2619. E. Barlow and F. Hamilton.
2586. E. Borlase.

Journal of the Society of Arts.

FRIDAY, NOVEMBER 30, 1866.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'clock :—

December 5.—"On the Trade in Foreign Cattle." By John Irwin, Esq.

December 12.—"On Old London: its Streets and Thoroughfares." By J. G. Crace, Esq.

December 19.—"On the Study of Indian Architecture." By James Fergusson, Esq., F.R.S.

Cantor Lectures.

The first course of Cantor Lectures for the present session will be "On Pottery and Porcelain," and will be delivered by William Chaffers, Esq. It will consist of six lectures, and will commence on Monday evening, the 21st January next, and be continued on succeeding Monday evenings.

The second course will be "On Music and Musical Instruments," to be delivered by John Hullah, Esq. Arrangements for a third course are in progress.

The lectures will commence each evening at eight o'clock, and are open to members, each of which has the privilege of introducing one friend to each lecture.

Medals.

At the Opening Meeting of the Session, on Wednesday, the 21st instant, Sir Thomas Phillips, Q.C., F.G.S., Chairman of the Council, distributed the Medals awarded by the Council at the close of last Session, as follows:—To Mr. J. C. Morton, for his paper "On London Milk;" to Mr. Thomas Gray, for his paper "On Modern Legislation in regard to the Construction and Equipment of Steam Ships;" to Dr. J. L. W. Thudichum, for his paper "On the Diseases of Meat as affecting the Health of the People;" to the Hon. Charles Gavan Duffy, for his paper "On some Popular Errors concerning Australia;" and to Mr. J. Bosisto, for the Importation of the Essential Oil of the *Eucalyptus odorata*.

Institutions.

The following Institution has been received into Union since the last announcement :—

Carlisle, Lord-street Working Men's Reading Room.

A new list of members of the Society has been printed, and any member can have a copy sent to him on application to the Secretary.

Subscriptions.

The Michaelmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Second Ordinary Meeting.

Wednesday, November 28th, 1866; Sir Roundell Palmer, Q.C., M.P., in the chair.

The following candidates were proposed for election as members of the Society :—

Bruce, Rt. Hon. H. Austin, M.P., Duffryn, Aberdare.
Carter, H. H., Park-valley, Nottingham.
Clarke, William Henry, 5, Size-lane, E.C.
Clayton, General Sir William Robert, Bart, 79, Gloucester-place, Portman-square, W.
Giffard, Hardinge Stanley, Q.C., Inner Temple, E.C.
Gilbee, W. A., 4, South-street, Finsbury, E.C.
Hooper, George, 246-248, Regent-street, W.
Humby, John, 48, Little Britain, E.C.
Manning, T. E., Eversfield-house, Bratton Clovelley, North Devon.
Rigg, Jonathan, Wrotham Hill-park, Sevenoaks.
Wood, John, Whitfield-house, Glossop.

And as Honorary Corresponding Members :—

Calcabale, Le Commandeur G. B., Consul de Monaco, Naples.
Manfredonia, Prof. Docteur Giuseppe, Naples.
Schrob, Le Docteur Alexandre, Strasburg.
Tortorelli, Le Comte Hercule Malvasia, Naples.

The Paper read was—

ON LIMITED LIABILITY IN ITS RELATION TO MANUFACTURES AND COMMERCE.

By William Hawes, Esq., F.G.S.

The subject I have selected for my paper this evening differs from those which usually occupy our attention, and some may think its discussion more properly belongs to a society whose object is the consideration of questions relating to the amendment of the law, and to the science of legislation, than to such a society as ours; but I hope to satisfy you that the introduction of limited liability partnerships into the general trade and commerce of this country is calculated to produce important changes in the relations of capital and labour, and of debtor and creditor—relations which, when sound, form the vital elements of our commercial prosperity; it consequently deserves careful consideration at our weekly meetings.

The time allowed for reading a paper on these occasions does not, when we have an eminently practical question to consider, permit us to devote any large portion of it to the history of the subject to be treated, so that I will, with a few words of introduction, endeavour to enlist your attention exclusively to the effect which has been, and most probably will be produced, by our recent legislation relating to limited liability partnerships.

Until within the last few years but two forms of partnership were in use in this country for commercial purposes. One, associations or companies consisting of numerous partners bound together for a common purpose, and trading under the protection of royal charters, or, more recently, under the provisions of special Acts of Parliament, each of which strictly limited the liability of the partners to the amount of their subscriptions; and

the other, the association of individuals as partners trading in their own or in joint names, with rules and regulations arranged among themselves for their guidance, but which did not release them, individually or collectively, from responsibility to the full extent of their fortunes for the debts incurred by partnership.

The grant of this individual immunity from liability for debts incurred by the first class of partnerships, was thought to be justified by the extensive character of the enterprises to be conducted at home, or from the principal seat of their operations being in our colonies or in foreign countries.

The most striking instances in times past of such chartered partnerships or corporations, were those of the New River Company, established in the reign of James the First, to provide the metropolis with pure water; the Bank of England, established in 1694, to conduct large monetary operations, the objects of both being the improvement and advancement of our social and trading interests at home; the East India Company, the Hudson's Bay Company, and the Hamburgh Trading Company, established respectively in the years 1660, 1669, and 1406, to conduct and stimulate the trade, then in its infancy, with our dependencies, colonies, and foreign nations.

The principle of limited liability, as applied to trading companies, is not, therefore, new to this country.

The second class, or the association of two or more individuals, for a common purpose, and with unlimited liability, has, however, always formed the ordinary type of partnerships under which the great bulk of the business of the country has been conducted.

In such partnerships each partner was liable, to the full extent of his fortune, for the debts contracted by the company or firm of which he was a member, but the difficulty which frequently arose in determining who were the partners led to constant litigation. The necessities of trade often requiring more capital than the partners possessed, it was very often provided by friends as sleeping partners, who took no ostensible part whatever in the business, whose position, as sleeping partners lending capital, was unknown to the creditors of the firm, and therefore, could not have influenced the credit given by them. Still, on and after failure, upon the examination of the books by creditors, the advance of capital to, and the receipt of a share of profit by such sleeping-partners being ascertained, proceedings were so frequently taken, and with such contradictory results, in order to throw upon them the liability to pay the debts of those to whom they had lent their capital,—when the distinction between the receipt of interest at a fixed rate upon the capital lent and the receipt of interest fluctuating according to the profits had not been carefully maintained, —that at last an endeavour was made to obtain an authoritative decision as to the principle of law applicable to such cases, which led to the judgment given in the well-known case of Waugh *versus* Carver, by which it was held—though this judgement by subsequent decisions was much modified—that whoever shared in profits should also be responsible for losses, not for his share of the losses only but for the full amount incurred, or so far as his means would allow.

This decision for some years governed all questions arising upon the liability of partners, and ultimately led to the suggestion of new modes of lending and borrowing capital, by which to avoid the penalties so unjustly thrown on capitalists, and aided very much in the formation of that public opinion which first carried the Limited Liability Acts, and then the Partnerships Amendment Act of 1865.

I cannot here dwell upon or trace the steps by which these measures were gradually forced upon a somewhat unwilling Legislature, but the repeal of the usury laws, the increasing number of charters granted, and of Acts of Parliament passed, in both of which the limitation of liability was the main feature, and the increase of our foreign trade with countries where the principle of limited liability was commonly applied to trading partnerships, all helped to remove a restriction upon the introduction of capital to trade, and an interference with the liberty of individuals to make such contracts for the conduct of their business as they deemed most advantageous, and led at length to the passing of the Acts of 1856, 1857, and 1862, and then to that of 1865, which, though in a very clumsy manner, have enabled men of business, whether associated in large or small numbers, to borrow capital, and to appropriate profits in any manner they may think most conducive to their prosperity.

I have said these Acts accomplished the object in view in a very clumsy manner. By the Act of 1862, the right of limiting the liability of partners to the amount of capital they advanced, and to that upon which alone credit was to be obtained, was restricted to partnerships consisting of seven or more persons. Fewer than seven partners could not enjoy the privileges secured by that Act, but by the Partnership Amendment Act of 1865 it is enacted that no one simply by virtue of his receiving a share of profits becomes a partner, or is thereby liable for partnership debts, thus, in fact, in an indirect and partial manner, introducing limited liability to private partnerships.

In associations of seven or more persons, under the Companies' Act, their names, and the capital advanced, must be registered in a public office, and credit may be obtained, as well upon the money subscribed as upon the known character and business habits of the partners so registered; but in smaller associations or private partnerships availing themselves of the provisions of the Act of 1865, and obtaining the aid of extra capital, for the use of which the partners are willing to pay a *pro rata* share of the profits, the names of the lenders must not appear as partners, nor must they take any public part in the management of the business, or it may be alleged that credit was given, relying on their known wealth and reputation, whereby they might be rendered unlimitedly liable for the debts of the firm in the event of its becoming insolvent.

But besides the clause to which I have been referring, this Act contains provisions applicable to all partnerships of very great value, for the remuneration of clerks, agents, and workmen, out of and according to the profits realised. The importance of this permissive power to masters as well as to men cannot be over-rated, and I shall refer to it again as I proceed.

The difference, then, between these partnerships and those formed under the Limited Liability Act of 1862, is that those formed under this Act are obliged to confine their operations to the objects described in, and to conduct their business according to the rules contained in, the registered articles of association, and generally to comply —when not inconsistent with their own registered articles—with the provisions of the Joint Stock Companies' Act; whilst ordinary or simple partnerships of one or more persons, availing themselves of the provisions of the Partnerships' Amendment Act, may obtain capital from any one, and give in consideration for its use a share of profits, without any restriction whatever on the mode of managing the business other than the care required to prevent the partners finding the capital being known to the public, or in any way pledging their credit as partners, or taking any ostensible part in the management of the business, thus approaching very nearly to the system "*en commandite*" in France; but they have the great advantage over partners in limited liability companies of being able to withdraw their capital if profits cease, thereby leaving the creditors of the business to their remedy against the ostensible partners only, whose credit and capital alone were pledged to them. This being the present state of the law, I will proceed to trace its probable effect on the future industry of the country.

Before doing so, however, I must call attention to the principles which used to govern the relations between

trader debtors, and creditors, and which many have thought, and which many, I believe, still think, have been most prejudicially interfered with by our recent legislation.

Long after Charters and Acts of Parliament, granting immunity to individuals from debts incurred by the governing body to whom the management of their affairs was entrusted became comparatively common in their application, the great principle of trade, that every one was responsible for the debts incurred by himself or by his agents, was as universally recognised and acted upon as it had been at any previous period; and this principle is, I believe, as universally acknowledged and acted upon now in all cases where the pledge of credit or a specific contract between parties can be proved, and the individual liability shown to exist, as it was before the sanction of Parliament was given to the Limited Liability Act of 1862; but so vast and so multitudinous are the commercial transactions of modern times, so great the ramifications of credit, and so essential is it to the prosperity of trade that the utmost freedom shall be given to the employment of capital, that it became absolutely necessary, in the interests of that trade and commerce we are all so anxious to encourage, that the responsibilities and privileges of partners in Joint Stock Companies and private partnerships should be placed beyond doubt. For this purpose the Act of 1862, applicable to all kinds of trading associations, was framed, and the pecuniary liabilities of seven or more persons associated in partnership for a common purpose were defined, and the exceptional state of legislation, which required the consent of the Government to a Charter or an Act of Parliament to each special act of incorporation for trading purposes, ceased to exist.

It was, however, impossible long to maintain a privilege to seven persons which was denied to individuals, or to small partnerships, and the Act of 1865, imperfect as it is, soon supplemented the Act of 1862, so that for all practical purposes, except as regards the ostensible manager or managers of a business, though not in a very scientific manner, limited liability was indirectly and partially introduced into private partnerships, and no one with ordinary care, lending money for trading purposes, need now be involved in unknown liabilities.

The effect of this legislation has been to bring capital into trade from classes which before never contributed anything towards the commercial enterprise of the country. All out of trade were before obliged to be content with investments mostly yielding low rates of interest, because any other might involve not only the loss of the money invested, for which they ought to be prepared, but also the risk of further and indefinite losses, for which they did not consider themselves morally or legally responsible, and which frequently involved them in entire ruin.

The Consolidating Act of 1862 did not alter the relation of any particular debtor to his creditor, or that of a member of a company who might pledge his own credit in its behalf, but it enabled every one to define publicly the amount he risked in any enterprise, and for which only at any time or under any circumstances he was responsible; and the rapid establishment of joint stock associations, for conducting all kinds of enterprises, since 1862, has proved how anxious the public was to employ its capital under these defined conditions, in trade and commerce, and also the vast amount of wealth which was still available (and perhaps owing to previous restrictions too easily available) for any purpose plausibly presented as likely to yield a high rate of interest. Another advantage afforded to the individual partners in joint stock trading companies is the freedom from all the penalties and inconveniences of bankruptcy in case of failure, and in this respect a very important alteration has been made in the relations between debtors and creditors. We may now have, as indeed we see every day, insolvent companies with all the partners solvent, and we may have a solvent company with the partners insolvent. In the first case, whatever may be the amount of debt, no one is responsible, for the credit was given with a full knowledge that only the subscribed capital of the company was applicable to its liquidation, and in the other the shareholders have no power to withdraw their capital from the solvent company however insolvent they may be, except by selling their interest to other parties. We have by this course of legislation removed the onus of bankruptcy from all persons trading as partners in limited liability companies. The creditors of such companies know the conditions upon which they give credit, and have no right to complain if they give it imprudently, and as little right to require the maintenance of a cumbrous and expensive court of law to assist them in saving what may remain of their debtor's property when insolvency occurs.

If there be no bankrupts—and if this anomalous state of the law continues there will be but few, for all private partnerships will be converted into small limited companies—there can be no need of the Courts of Bankruptcy, which are now maintained apparently only in the interests of those receiving salaries under them. They are even now useless to the great bulk of trade and commerce, for almost every important estate is settled without their aid, and is indeed carefully kept out of the court so that the cost of winding up may be borne, and the mode of arrangement directed, by those who will suffer from bad administration, and have to pay the costs. Whether this freedom from the responsibilities attaching to debt when trading under the Act of 1862, has to this time, or will in times to come, produce a recklessness in the management of limited liability companies, time alone can prove; but this is certain, that no system of legislation can contain a greater amount of uncertainty in its administration, of extravaganee in the application of the funds entrusted to it, more completely protect the dishonest trader, and more thoroughly promote commercial immorality, than is to be found in the administration of the law in our present courts of bankruptcy.

Previously to the enactment of the Limited Liability Acts of 1856-7 and 1862, the adoption of the principle of association and the advantages it secured to working men, when honestly conducted, was making rapid progress among them, but the legal difficulties arising out of the then state of the law of partnership, interposed so many obstacles to their safe management, that success was rather the exception than the rule. Indeed, to all classes the state of the law of partnership as administered before 1862 was restrictive, onerous, and injurious.

Since that time a new state of commercial enterprise has arisen, and it is the object of this paper to trace its course during the few years it has existed, and with great diffidence and caution to point out where it has been too inconsiderately introduced, and also to show what great results may be anticipated from it when experience has been obtained, and its use and its abuse shall be thoroughly understood.

As in the period preceding 1847, when the demand for capital by railway companies was so liberally responded to by the public, so since 1862 an almost unlimited demand for capital to be employed through the agency of limited liability companies in every branch of commerce and manufacturing industry has been met by a corresponding supply. New forms of employing capital have arisen—and the public appeared to think that because old concerns were converted into joint stock companies—because new manufacturing and trading companies sprang up in all directions, and because associations for forming such companies were established and appeared to meet with great success, that they would each bear an almost unlimited amount of preliminary expenditure never dreamed of in private trade before a shilling was earned, and would ultimately realise fabulous profits. The rapidity of formation

was so great that the difficulty, indeed the almost impossibility of finding competent officers, and competent directors to manage concerns, the mode of conducting, and the business of which, previously to their election, they had little or no practical acquaintance with, appeared to be entirely overlooked, and the race seemed to be rather how many old concerns could be converted into limited liability companies, and how many new ones could be formed in the shortest space of time, than how soundly and safely they could be established. Situations involving the management of millions were filled by persons never previously having had the entire responsibility of controlling thousands.

The result has been, as it was in former times, great disappointment and loss to individuals, but with, I believe, great benefit to the country. The loss has arisen mostly from the principle of limited liability not being fully understood, and from confusion existing in the minds of many between paid up and subscribed capital, so that as it was the interest of promoters to ask for as small a cash subscription as possible at first, and to represent that it would be sufficient for the purpose in view, little or no attention was directed to the unpaid portion of the subscribed capital, and to the certainty of calls being made upon it under almost any circumstances, but especially if adverse times arose. In fact, whilst the shareholders became members of a limited liability company, they subscribed for so many shares, representing such large sums, that their liability might as well have been unlimited as regarded their ability to meet the limited amount for which they became responsible. The principle which governs trading under limited liability was either overlooked or forgotten. The liability of a limited company is restricted to the amount of its registered capital, and this sum, which creditors know connot be withdrawn or reduced except by losses in trade or fraud, necessarily limits the credit it ought to receive. The creditors, therefore, have no claim on any one, and have no one to blame but themselves, if they incur losses by giving credit to an amount which is not secured by their registered capital; but if shareholders, limiting their liability or credit to a fixed sum, advance only 20 per cent. of that sum, then the creditors become comparatively careless as to the amount of their debts, because, if the management be bad, and losses incurred, they know that capital to four times the amount of that advanced when their credit was given, is pledged for the payment of their debt. The imprudence of the debtor in undertaking such extensive liability relieves, and naturally so, the creditors from the exercise of their usual caution, for it seldom happens in ordinary partnerships that creditors know so accurately the amount of their debtors' capital as they do that embarked in a limited company. The burden of improvident and reckless trading falls, therefore, by their own voluntary acts, on the general body of shareholders. The managers—whose conduct has led to their ruin — often comparatively small shareholders, escape with little loss or inconvenience, and the creditors are paid in full; whilst those whose excessive confidence in the one, and whose promise to pay in full was fully traded upon by the other, bear the loss. Still, notwithstanding the losses, the misery and want of confidence which this state of things has temporarily produced, I believe, having great confidence in the advantages to be derived from the prudent application of the principle of co-operation, that the practical experience gained so rapidly, and the improved knowlege of the limits within which joint stock enterprise can be profitably employed, will so direct the future investments of capital in like undertakings, as ultimately to realise to individuals and to the country the full advantage of co-operation in all the great industries of the country. But there is no part of the recent improvement in the law of partnership which will, I believe, in time, confer such benefits upon the country, and particularly on the working classes, as that, which in addition to the opportunity workmen now have of buying shares in the limited liability Companies in which they are employed, enables masters to appropriate some portion of their annual profits to workmen, either in lieu of or in addition to wages, without any of the complications of partnership, or the necessity of converting private partnerships into public companies.

The advantages, then, of association and co-operation are now open to all classes. The more wealthy can unite to conduct large monetary and commercial undertakings, the shares in which may be of a high denomination; the middle classes, including the members of all professions, can unite in manufacturing and trading industries to their mutual benefit, and that large class of producers who depend on weekly wages may combine to obtain at the cheapest rate and of the best quality a supply of the necessaries of life, and a fair and legitimate mode of influencing the rate of wages never before open to them. But whatever may be the pecuniary advantages derived by individuals from association under limited liability, those to be derived by workmen, and through them by the State, either by their becoming shareholders in the large establishments where they are employed, or by their receiving by special agreement a certain portion of the net profit, after the payment of proper interest on the capital and salaries to the partners, are of far greater moment.

If one workman only among the thousands employed in many large works becomes a shareholder, he will, half-yearly, receive a copy of the balance-sheet, and learn on authority the net profit realised by the joint application of the capital and labour engaged in producing the return stated in the official document then in his possession.

If that profit be very large, no one could feel surprised at the workmen asking for some, however small, participation in it, and I do not think any board of directors could safely, having in view the future prosperity of their works, resist an appeal, if properly urged by the men, for so fair and equitable an appropriation of a portion of the profits. For the same reason that I think such an appeal to a board of directors could not be resisted, I believe it will be found to be the interest of every large employer of labour, from the banker or merchant to the manufacturer and miner, to declare to those in his employment his intention to appropriate annually a fixed proportion of his profits, after the payment of interest on capital, for division among all who have contributed, by their minds or hands, to the realization of that profit; the sum applicable to each to be dependent upon the position held by him and upon the influence his exertions have had in producing the general prosperity of the works.

There are now a sufficient number of instances in which this principle is in partial operation, and where the results are known, so that the advantages derived by the adoption of this system, from the increased diligence, care, and energy displayed by all parties interested, are admitted, and it is believed that they amply repay, directly or indirectly, the extra charge thereby apparently thrown upon the business.

I have not time to quote instances which have come under my own observation, but they comprise a large professional business (legal), and manufacturing and mining establishments.

In fact, this mode of remuneration will strike at the root of the evils of trades' unions—that is, so far as they are directed to restrictions on labour. If every man, in addition to his wages, is a partner in the profits of the works in which he is employed, and is made to feel how much profits are decreased by any undue interference with the freedom of labour, and that his half-yearly bonus is lessened by such interference, he will soon become, if not an opponent of restrictive trade regulations, a very lukewarm supporter of them, and an

unwilling subscriber to the funds of associations which directly reduce his receipts with very small prospective, if any, advantage.

It is only by showing to working men how their material interests can be improved by other and better associations that we can expect to influence their conduct in respect of trades unions. Their object is to obtain higher wages; let them be satisfied that these can be secured by working for one common purpose with the master, and I do not believe they will be so easily as at present led away by the leaders of trade societies, who have generally other ends to serve besides the prosperity of those they represent. Whatever advantages may be obtained by union are only realised through great sacrifices of money, time, and labour, much distress, and frequent disappointment, and I think it will not be difficult to show them that they will gain as much and avoid this discomfort and loss, now they can be admitted to share in the prosperity of the work in which both are engaged, if by kindly arrangement with their employers they avail themselves of the wise provisions of the Acts of 1862 and 1865, and thus form a trades union for the beneficial purpose of promoting the welfare and profit of both masters and men.

If, then, proper means be now taken by all employers of labour to enlist the good will and energy of their men by giving to each workman a personal interest in the profits resulting from his labour, the existing antagonism between labour and capital will be gradually weakened, till, in a period not very distant, we may hope to find all classes of producers of wealth united in a joint endeavour to obtain by most healthy co-operation the best results for their mutual benefit.

For myself, I cannot express surprise that the antagonism, now so often complained of, should exist between labour and capital. The men feel day by day how little their physical position has been improved since their fathers' time, and must be sanguine indeed if they can see much prospect of their children being in a materially improved position to their own. Their work is as severe—their houses are but little if at all improved—their food is no better—and the education given to them as children, hardly ever of so practical a character as to be useful in after life, they have little, if any time, to improve. I am of course speaking from a workman's point of view, for admitting, as I am glad to do, that during the past twenty years improvement has in many respects taken place in their social condition, yet looking at it as a whole, I fear it has been so gradual, and from bad to only a little better, that they do not, indeed cannot realise it. Can it then surprise us that they should look with some jealousy at the enormous fortunes accumulated all around them, often within their own lifetime, and at the princely state in which their employers live? It appears to me to behove all whose success is dependent upon the labour of others, and especially those who employ large numbers of workmen, to think seriously of the great advantages they may derive from the improved spirit which would animate the whole of their establishments, and the great benefit which they may confer on their men by placing them, as they now can do by availing themselves of the provisions of the Act of 1865, in the position of partners in the products of their labour, and as parties interested in the most economical and efficient management of the business. The saving to be effected by each of the 1,000 men employed in a large factory—in time, in material, and in general economy—if he felt he was working for his own benefit, would produce a fund that would, I believe, surprise both masters and men.

But it may be asked whether the workmen who receive a portion of the profits by an amicable arrangement with their employers will have any right to interfere with the management of the business. To which I reply certainly not. They will not be partners in the business, though they take a share in the profits—a fixed and definite share, which will vary with the profits, but in respect of which they will not bear any losses when they occur, nor have any rights as partners. Their share will only be payable after the fixed charges for interest on capital and management, and all losses are provided for, and the liability to loss from causes incidental to all trades, or arising from commercial changes which no one can guard against, will of course determine the proportion of the gross profit to be appropriated to the principals.

Until recently it would have been objected to this proposition, that masters would not like to expose their profits to their workmen or to the public; but the rapid conversion of private firms into joint-stock companies, which are obliged to publish their profits and account for losses, quite removes this objection.

But whether in joint-stock companies or in private partnerships, no arrangement of this kind could be advantageously adopted unless with the cordial co-operation of masters and men. The entire establishment must be animated with a desire to promote its prosperity, and the object of all must be to prevent those unseemly and most injurious differences between masters and men which ultimately end in strikes.

Indeed, I can hardly conceive there can be two opinions that, if wages are to be raised—which, in other words, means that the men are to have a larger share of the profits derived from their industry—it is better they should have this increase when profits are good, and under an agreement voluntarily made between them and their employers, than when angry feelings are excited by a strike or a threatened strike. Strikes generally originate when trade is either very good or becoming bad—in the one case to obtain higher wages, in the other to prevent a reduction. In either case the system of regularly appropriating a portion of profits must be beneficial to the men. In the first they would watch carefully an improving demand—rejoice in it, and feel an interest in their work, and growing contentment would take the place of jealousy and discontent; whilst in the other they would be sensible of a decreasing demand, and know full well that profit would fall in proportion, and that their share must necessarily decrease.

It is then in this direction that in the course of time I look for the greatest results from the operation of the Acts of 1862 and 1865. But I must now refer to the effect which the gradually-increasing application of the principle of limited liability to industrial undertakings, through the action of joint stock companies, will probably have upon capital, and therefore on the production and cost of our staple manufactures.

The law of limited liability did not, *per se*, increase the capital of the country; but by the removal of restrictions on the free employment of capital in trade, it attracted to business a vast number of small sums, forming a large total in the aggregate, and thus practically increased the amount of money seeking employment in trade which had been previously excluded from it. It was not, therefore, by new capital, but by a change in the investment of capital, that the new joint stock companies have been supported.

The certain result of suddenly withdrawing capital from one investment, and placing it as suddenly in another, is unduly to depress the one and to inflate the other, and this state of things will continue until, in the course of time, the normal relative position of the two industries or investments shall be restored. But if joint stock companies are as successful as under good management they ought to be, the high rate of interest they will return to the shareholders must increase the value of money to be employed on mortgages and other non-trading securities, and in all probability a higher than the present ordinary rate of interest will, for a time, be obtained on all such investments, if it does not produce

a wider and more lasting effect, and raise the general rate of interest in the country.

I have now occupied the time allotted to me, and will only add by way of general summary that whilst admitting the losses, bad management, and disappointment which have attended a large number of the joint stock enterprises which have been established since the passing of the Act of 1862, I cannot see in them anything to shake our faith in the soundness of the principle of limited liability. If in all the cases of failure now so patent, not only the principle but the practical operation of limited liability had been strictly adhered to, and the amount of capital actually paid up had been the sum to which liability attached, but few of the calamities of the present time would have occurred; it was because the principle on which such companies should have been formed was not understood, or if understood was not acted upon, that misfortune has followed so rapidly on their formation.

The loss arising from the stoppage of any business—the loss of goodwill—the loss by peremptory sale of stock—and the expenses of winding-up, whether voluntarily, in bankruptcy, or in the Court of Chancery, are enormous, where there is a fund to work upon—but all these would be reduced to a minimum if no calls could be made, and no funds found to provide for legal contentions.

There is one case on record of a limited company with a capital and loans of £500,000, raised in £1 shares, which in the course of a few months lost the entire capital, and incurred, in addition, £60,000 of debt, on open current accounts. Had not the call been paid in full, the litigation in winding-up that company would not have been closed to this day; but as there were really no assets, nor any fund from which to pay costs, the company ceased to exist, no odium or responsibility appearing to attach to those whose bad management terminated so disastrously, and the circumstances are all but forgotten.

The object to be kept in view by all who join limited liability companies is to see that their liability is limited either to the cash advanced, or to such further payments or calls as they can conveniently make if called for in a short period of time. Adherence to this rule will obtain for industry the full advantages of the co-operation of numerous partners, and to the partners the freedom from unknown risks which it was the intention of the framers of the Act of 1862 to secure to them.

But there is still another point from which to view the effect which the impetus these Acts will give to the formation of co-operative societies, and the association, for one common purpose, of masters and men, and that is its political aspect.

At a time when all appear to admit that more political influence must be given to the industrious classes, and when the beneficial operation of any such measure, either nationally or socially, must depend upon their acquaintance with the economical principles upon which their own prosperity, as well as that of their country, rests, it must be of the utmost importance that they should thoroughly understand the beneficial character of the legislation in their behalf during the past few years, and that they should be thoroughly instructed as to the best mode of applying it to their own advantage.

But before the full effect of this legislation can be productive of much practical good, masters and directors of joint-stock companies, especially those conducting large industrial operations, must feel it to be their paramount duty to place the subject before their men in a plain and popular form, and must make such arrangements for the appropriation of the portion of profits assigned to them as will satisfy them of the *bona-fide* character of the arrangement, and that its realisation may be fully relied upon. There must be candour and confidence exhibited towards the men, who will seldom fail to return it.

Confidence being thus established—the progress of legislation upon trade, the importance of every regulation or treaty affecting each department of industry, and by which restrictions upon labour are removed, or the free interchange of commodities between foreign countries promoted — will be watched with intelligent vigilance, based on direct self-interest, and it does not appear to me too much to expect under such circumstances, that our recent legislation, if acted upon in a right and earnest spirit, will convert combinations of workmen, now actuated by feelings and motives independent of, and often hostile, to their employers, into combinations to stimulate, by all legitimate means, the prosperity of each branch of our national industries.

If, then, by affording facilities for the establishment of co-partnerships in industry, or for the appropriation of a certain per-centage of profits of ordinary partnerships under the Act of 1865, to all engaged in producing manufactured articles, whether it be the reproduction of cheap works of art, or the manufacture of the necessaries of life, or the importation of raw materials from foreign countries, greater results can be obtained than by adhering to the old plan of allowing all classes of producers to work each in their own circle and striving for their own personal ends only, that system of legislation which has inaugurated such a change in the relations of capital and labour will rank foremost among those to which this country will be indebted for the future prosperity of its Arts, Manufactures, and Commerce.

DISCUSSION.

Mr. J. Gerstenberg said it seemed to him that the question for consideration was not so much whether the principle of limited liability should or should not meet with their approval, as whether co-operation and joint-stock action would prove favourable to the development of the trade of a commercial community. The author of the paper had come to the latter conclusion, he (Mr. Gerstenberg) thought, on insufficient premises, and had attributed failure to the want of appreciation of the true principles of limited liability, but he had omitted to inform them what he considered those principles to be. He (Mr. Gerstenberg) believed co-operation was very useful in every instance where private enterprise could not be brought to bear. Such things as railways, canals, &c., were beyond the reach of private individuals, but in his opinion it was a mistake to form companies to carry on businesses which could be better managed by the labour and energy of one individual than under the complicated system of a company; and he believed that principle would soon be established to such an extent that no persons would be found to take shares in companies of this character. Mr. Hawes had brought before them one of the "dissolving views" of recent times, in which a capital of £500,000 appears to have been entirely dissipated in a short period, but this might be regarded as one of the eccentricities of the present age. With regard, however, to the principle of limited liability, it had long been recognised in other countries than England; but in this country, from some unexplained reason, it had been formerly thought a necessary principle of partnership that a person who held a single share in a joint-stock concern should be liable to the last farthing of his means in respect of that share. This was a monstrous system, and he would never become a shareholder in an unlimited company upon principle. With respect to the mode in which the limited liability principle should be applied, he thought we might take a lesson from our continental neighbours. Among them, if a house of business, or private concern, wished to increase its trading capital, the principals could take in partners, with limited liability, and thus form themselves into a *société en commandite*, in which the acting partners are liable to the full extent of their means and the others to the amount only of their shares. When, however, limited partnerships were adopted in this country, this distinction

between the two classes of partners was not preserved. A large sum was usually in the first instance asked for the good-will of the concern; then the acting partners became liable only to the amount of shares they held. An act was passed in 1805 to introduce the system of permitting parties to advance capital to trading firms without making them liable beyond the amount so advanced. This, however, had been but little acted upon. One influence that had operated most unfavourably upon limited liability companies in this country had been the jobbing on the Stock Exchange. Confidence or no confidence in the concern was regulated by the quotations on 'Change, and not from actual investigation of the affairs of the company. He might say that his own experience in these matters had been dearly bought; and while he expressed his thanks to the gentleman who had so ably brought this matter before them, he could not entirely agree in the sanguine views he had put forward in reference to the future. This country had, indeed, paid dearly for its experience, as far as it had gone, of limited liability, and he agreed with Mr. Hawes that, in the great majority of cases, failure had resulted from incompetent persons having been placed in the position of managers. The discussion of such topics in a society like this could not but be beneficial, and he had no doubt the ventilation of this question would lead to good results.

Mr. S. Sidney said, having acted as secretary to two limited liability companies, both promoted by persons of the highest respectability, one having been a total failure, and the other eminently successful, he might be permitted to offer a few remarks on this very practical subject. They must all agree with the last speaker that limited liability ought only to be a vehicle for raising money for private undertakings, when private individuals were unable to raise it themselves. But during the last year or two limited liability seemed to have run wild; the consequence was, not only had a great many foolish things been brought before the public on the shoulders of limited liability, but many things which would have worked well under the moderate expenses of private management had come to the ground when burdened with the expenses of directors, secretaries, lawyers, &c., which commonly appertain to a public company. The question to be considered was—what were the cases in which they could or could not properly apply the system of limited liability? It was quite evident that there were an immense number of businesses the success of which depended mainly on the individual ability of the persons who managed them. When they had good men as managers the business succeeded, but if they were replaced by incompetent persons, that which had previously been carried on with a good profit was reduced to a positive loss. He had known private businesses which had been profitably carried on through generations of a family, and which had been thought good opportunities for being formed into limited liability companies; there were businesses in which it appeared that additional capital might be employed with advantage, but at the same time the nature of the business might be such as to require the constant daily attention of a person who entirely understood it. He knew of one instance in which it was thought the parties had made a good bargain when they gave a gentleman a salary as manager equal to half the total profits which the original partners realised. Besides this, a large sum was expended in the improvement of their premises, and then the concern was opened on a new scale. But it soon failed, the gentleman appointed as manager proved more ornamental than useful, and it turned out that his wife had been the real manager, and she declined to give the shareholders the benefit of her assistance unless she was paid a salary too. Taking the salaries of the husband and wife, remuneration to directors, and legal expenses, it was found that those sums entirely swallowed up the profits realised. The result was that up to the present time that company had paid no dividend to the shareholders, and at some future time they would probably hear that the concern had reverted to the original proprietors, and had again become a profitable business. Instances of this kind might be multiplied to a great extent. Another company, formed thirteen years ago, before limited liability came into operation, but which had since been brought under it, was fortunate enough to secure as promoter and manager a gentleman of great practical ability. The result had been that during the whole period of its existence the company had scarcely omitted paying a regular dividend of 20 per cent. If a man less capable had been at the head of that business the probability was it would have been carried on at a loss. The public of this country having lately passed through a crisis so severe, it was to be hoped that they had gained some little experience by which they would profit for the future. With regard to the other point discussed in the paper, while admitting that the working classes could do great things in the way of co-operation, he did not think that any very great results could be anticipated from giving them a per-centage of the surplus profits of the concern in which they were employed. The real fact was that a considerable rise had taken place, from various causes, in wages, and he thought the artizan would not be content to forego the certain advantage of that increase of pay for the chance of receiving a bonus of £2 or £3, at the end of the year, as his share of the surplus profits of the business. He was rather surprised to hear, from so high an authority as the author of the paper, remarks to the effect that the position of the working man had not materially improved. Although he confessed that position was far from satisfactory, it was an immense improvement upon what it had been some years since, and he looked more to what the working classes could do for themselves than to what could be done for them to promote further progress. He was not yet an old man, but within his own recollection a very remarkable change had taken place in the position of the working man. Formerly he was content to wear second-hand clothing: now this was not the case. At the present time there was no doubt discontent among working men, which arose partly from the fact that their education had improved, and they had become a reading and a thinking class, and noticed inequalities which they did not notice before. Legislation, however, by removing taxes on various necessaries, had done much for them, and their position was no doubt most materially improved.

Dr. Pankhurst remarked that Mr. Hawes had introduced this subject with an apology, for which there was no necessity, for the progress of manufactures and commerce depended essentially upon the conditions and restrictions which regulated the association of capital, experience, and industry; and if the subject was intrinsically fit for discussion before this Society, certainly the time was most opportune. Whilst they were in the midst of the crash of enterprises, then was the most fitting time to make an appeal to principles. By the operation of two legislative enactments—the Companies' Code of 1862, and the Partnership Amendment Act of 1865—the entire community had placed before it the opportunity of lending money for commercial purposes with a liability which was precise and determined. Now, on the occasion of the presentation of that opportunity, there arose two questions of great moment. First, what effect would this opportunity have, on the one hand, on the lender of the money, and on the other, upon those who trusted the company into which the money was to go? To take the first point, if a man lent his money in an enterprise with the details of which he was not conversant, or in the operations of which he had not the opportunity of taking an active part, to say that his liability should be indefinite was practically to impose a barrier to the money being lent at all. Indefiniteness of liability was paralysis

to confidence in the lending of money. But what guarantee had the lender for the safety of his investment? He had, under the code of 1862, three substantial guarantees. He was certified by a publicly registered document of three leading facts, viz., the object of the company, the capital of the company, and the general procedure by which it was to be governed. But if he were a wise and prudent man he would seek two other guarantees—he would satisfy himself that the thing was likely to succeed, and also that it was in the hands of people who would work it well. If those two common-sense conditions had been applied, nine-tenths of the companies would either not have been started at all, or would have succeeded. But there was another aspect of intense moral significance. They heard of limited liability companies with unlimited power of obtaining credit, combined with an easy way of escaping payment. Was that in conformity with the facts of the case? What were the conditions under which a creditor dealt with a company? He had the three guarantees which the lender of the money had. If, in the face of those facts, he incautiously sent in his goods to the company, was the principle of limited liability responsible for the mistakes that were thus committed? He thought not, and it was not fair to charge those consequences upon the principle of limited liability. With reference to the provisions of the Partnership Amendment Act of 1865, the first speaker appeared to consider that they were not so satisfactory as those existing abroad, in the undertakings known as *sociétés en commandite*. In France, if a partnership of five persons openly, in the eyes of the commercial world, conducted a business, those five men were partners in the full sense of the word, and were liable for every penny they possessed; but supposing they associated with them three other men, who did nothing but lend money and receive profits, in that event there were publicly certified five facts: first the names of the five acting members of the firm; secondly, the nature of the business; thirdly, who of the five were the actual managers of the business; fourthly, the amount of capital lent to them by the other persons referred to; and fifthly, how long the partnership was to exist. That constituted a *société en commandite*. In England they had the same thing, except that they did not register the five names as above. He would not now enter upon the question as to the desirability of such a registration. That was a subject which had been discussed for years, and a parliamentary vote upon it was taken in 1865, and on consideration it was decided not to register; but it was of importance to observe that the ostensible manager of a concern should still be responsible to the full extent of his means, and that was the law now. There need be no doubt that out of the principle of limited liability must ultimately grow an immense social benefit. Those who had money to invest would know what amount of liability they contracted when they lent it in the commercial world; and when creditors exercised the virtue of caution they themselves would be safe. Under these circumstances there would soon not be a farthing of capital in the country the owners of which would not be morally bound to come forward and assist some commercial enterprise, and thus arose an opportunity of connecting what had hitherto been too much regarded as hostile interests—capital and labour.

Mr. Moxon considered that up to the present time the law with respect to partnership liability had been a signal failure, as was testified by some 3,000 cases of companies in the winding-up court, involving a very large amount of capital which had been lent by the public either from confidence in the names of the directors, or in the enterprise itself, and who had lost the whole or a great part of their money. Whenever there was a plethora of money in the country, which appeared to occur about every ten years, people became dissatisfied with three per cent. when consols were at 100, and they looked about to see if they could not make 5 or 6 per cent. in other investments. Looking at the various schemes brought forward, the directors were in many cases only appointed to act as such for a certain time, and the articles of association were drawn up after the shares were subscribed for, and they knew from experience that those articles were scarcely ever looked at till some disaster was apprehended, or had actually arisen. One might have supposed that by the frequency of these commercial disasters the public would have become disgusted; but there was something so tempting in prospectuses promising 15 to 20 and 30 per cent., that the public could not resist them, and the smaller a man's capital was the more eager was he to make a large per-centage out of it. It was a well-known fact that clergymen of all denominations were generally the greatest sufferers in all joint-stock disasters. With regard to the mode of conducting the business of some companies, Mr. Moxon mentioned an instance in which, for a given purpose, the holdings of a few large shareholders were split up and disposed of to other persons so as to obtain a majority at a meeting at which a special point was to be carried. Mr. Moxon animadverted in severe terms upon the system which now so extensively prevails of taking directorships as a matter of business, by which he said large incomes were made from the fees paid to directors, and a larger amount by speculating upon the knowledge which their position gave them. When they saw the great number of companies that had lately collapsed, he was astonished that the public should be allured by the fresh baits that were held out to them. He believed that under limited liability, with restrictions which would bring character and honesty to bear in the conduct of these large concerns, joint-stock enterprise, ably and faithfully managed, would rank amongst the most prosperous investments that were to be met with in the present day.

Mr. Edwin Field expressed the deep interest which he felt in the subject, and regretted that the two really great questions treated by Mr. Hawes should have been included in one paper, as he considered each was worthy of separate consideration—the co-operative system being perhaps the most important. With reference to joint-stock companies, there was one system which, as far as he was aware, had never been yet carried out in this country, viz., companies under guarantee, working out the *commandite* principle. He believed the reason why so many companies had failed was because the principal object of the promoters was to get the shares on the Stock Exchange list, the real object being lost sight of in the desire for speculation in the shares. He did not agree with the last speaker as to the number of companies that had been brought under the operation of the winding-up Act; he thought 200 was nearer the mark than 3,000. To judge of the advantages of limited liability he thought they should look to the living companies rather than to the defunct ones, the great majority of the latter having been started by persons who never intended to remain in them after their purpose was served. The fact of its being a matter of anxiety in the promotion of a company to get it upon the Stock Exchange list, might be regarded as a distinctive mark of its being merely got up for sale. His own personal inspection of such concerns had been that of a surgeon who made a *post-mortem* examination for the purpose of finding out the nature of the disease that had killed them, rather than that of the gentleman (Mr. Sidney) who had acted as secretary during their vitality. His own experience was that the success or non-success of an enterprise mainly depended upon the character and business qualifications of the person by whom it was managed. The other question treated of in the paper, as affecting the employés in large business concerns, was one in which he had long taken the deepest interest; and it was a great satisfaction to him to be able to state that in the firm with which he was connected in the legal profession, the system of allowing the clerks in the office to participate in the residuary profits of the business, had

been adopted for several years with the most gratifying results to all parties. It not only made them more energetic in earning the profits, but also in detecting fraud and peculation on the part of members of their own body, by which these profits might be diminished. It also promoted what he was sure they would all cordially appreciate—the most friendly and confidential relations between the employers and those under them; he was happy to say that thinking men in his own profession were adopting this system, and he saw no reason why it should not obtain amongst all the ramifications of labour. He thanked Mr. Hawes for bringing the subject forward, and he was delighted to find the extent to which the system was adopted in many of the great commercial undertakings of the country.

Mr. E. Dibley disagreed with the opinion expressed by the first speaker, that no sensible person would eventually take shares in limited companies, except in those undertakings which could not be carried out by a few individuals, such as railways, &c.; for all that had been stated with regard to the failure of the limited liability system on a comparatively small scale equally applied to concerns of a gigantic description. It was mentioned by one speaker that people were especially attracted by the promises of large profits put forward by the promoters of bubble companies. No doubt this was the case, but this had no essential connection with the principle of limited liability, and, for his own part, he thought that the problem of the true relations of labour and capital was to be solved by the limited liability principle. They knew from experience that the application of new ideas often created a great amount of corruption at the beginning; for there were always persons ready to take advantage of a new system for the sake of their personal interests and at the expense of others. What they wanted was limited companies based upon good principles, with good men to manage them, and, looking to the vicissitudes of life, it would be an advantage in such concerns to have persons growing up under the wing of the managers, so as to be ready to take their place, in the event of their retirement, from death or otherwise. To turn to the question treated of in the latter part of Mr. Hawes's paper, he thought that opportunities would thus be afforded by which working men might be drawn into closer sympathy with their employers, and the relations of labour and capital be thus harmonised. This was, indeed, a wise application of the principle of limited liability. Being himself connected with a large manufacturing concern he knew how much the profits of the business depended both upon the quality and the quantity of work that was done, and the honesty with which it was done, and if the men could be brought to a participation in the profits of the concern he was sure it would conduce to the interests of all parties, and put an end to that antagonism between masters and men which unfortunately now too generally existed. He would mention that a friend of his had suggested what he thought an excellent plan for carrying out this co-operative system. Supposing an *employé* was paid £100 a year, and the profits of the concern amounted to a certain sum, the employer could hypothecate to this man a certain number of shares, and if the business paid a per-centage above a certain fixed amount, he would be entitled to a bonus proportionate to the number of shares so hypothecated to him. Notwithstanding the vast manufacturing resources of this country, they saw every year large sums of money going out in foreign loans, for which in many instances a very poor return was made. Was it not better to employ that money in developing the manufactures of our own country, and by that means increasing the wealth of all classes of the community?

Captain J. Selwyn, R.N., said that notwithstanding the dismal picture which some of the speakers had placed before them as to the working of limited liability in this country, he thought we ought not to forget how much had been done by companies established under Acts of Parliament, such as railway companies and others, for promoting the commercial prosperity of the country, and he thought this principle wisely applied would still do much for the progress of the world at large. Small partnerships would not meet the demands of modern enterprise. As well we might suppose that the metropolis could be supplied with water from the old stand pumps, and its streets lighted with the old oil lamps, as that the old partnerships of three or four individuals could meet requirements such as those of the Atlantic Telegraph, or a great line of steam communication. He thought the per-centage of successful companies had been too much lost sight of. Those which did succeed were not generally much talked about, whilst those which did not were forced into an unpleasant notoriety. It was too much the habit in these matters to find fault with the laws and the Government. The idea of appealing to the law was one which we derived from our belief that the law was a remedy for everything; but those who tried it generally found it was successful in involving them in great expense, but not so successful in giving persons what they thought was justice. It was true directors of companies were chosen in many cases not from their personal merits or acquaintance with the business to be embarked in, but the East-end sought for lords, and the West-end for men of money, and both classes consented to belong to Boards on which they seldom if ever sat, and no doubt companies had suffered much from such a state of things. With regard to the idea of the participation by workmen in the surplus profits of a concern, there were two ways in which that could be accomplished; first, by the workman, who ought to have a good idea of the merits of the concern, buying the shares in the market; and, secondly, by merely having assured to him a certain share in the surplus profits in such proportion as might be agreed upon with his employers. No doubt this might have an effect in some cases, but he (Capt. Selwyn) thought that, in most instances, unless a workman could be taught to do his duty in the station in which he was placed, in an honest and God-fearing manner, upon moral principles, no amount of participation in profits would induce him to do so. To return to the question of the failures of limited companies, he believed that many of the largest failures they had lamented over during the last six months were distinctly traceable to the jealousies of financial kings, who saw their empire about to be invaded and themselves forced to compete in the financial market, as other people were obliged to do in the commercial market. There was, however, a plan to which he wished to draw attention, that of protection, by means of insurance, from loss under limited liability. It was not impossible to insure a house even when a specially hazardous business was carried on in it, and in like manner he thought the same system might be applied to losses by public companies. It was impossible to get shareholders to inspect books before they entered into a company, but they invested in it because they were told wonderful profits would be made, and that was how many people were ruined; but by a system of insurance they might provide against risks other than those to which the general run of business was liable (for against the latter no one could provide), and thus they might obtain a guarantee against bubble companies, and shares would not be run down by interested "bears," nor run up by interested "bulls." The rule of limited companies he believed had been success, and failure the exception, and with the elimination of some evils still existing in the system, he thought the ultimate progress of joint-stock enterprise in this country was certain.

Mr. Figgins, jun., regarded limited liability as one of the greatest successes of the age. A great point in the present day was to get an improved class of directors, so as to check undue speculation in the shares; moreover, it was to be remarked that while the amount of the shares was limited there was no limit put to the number of shares

allotted to one individual, who might thus render himself liable to ten times the amount he would ever pay. Individual energy and practical ability were the qualifications for managers; and the great fear in these matters was that duties might be relegated to incompetent and sometimes adversely interested managers.

The Chairman said he was sure the meeting would all agree in tendering their best thanks to Mr. Hawes for the very able paper he had read.

The vote of thanks was then passed.

Proceedings of Institutions.

East Lancashire Union of Institutions.—The fifth report of the Union has just been issued, and relates to the operations of the Society for the past three years. It also contains a paper "On the East Lancashire Union in its bearing on the Question of the Education of the Manual-Labour Classes," read at the late meeting of the Social Science Congress in Manchester, by Mr. Ughbred Kay-Shuttleworth. The report states that since 1864 the Council have had the misfortune to lose the very valuable services of their two organising masters; and also, owing to the distress through the cotton famine and the consequent embarrassment of the Institution (from which they have not yet recovered), they have been obliged to reduce their staff, and now employ only one organising master. The number of candidates who have attended the annual examinations, which are held in Burnley, the central town of the Union, during the month of June, have somewhat decreased since 1864, but the results show a much less percentage of failures. In 1864 the number of candidates was 158, of whom 66·5 per cent. passed. In 1865, out of 85 candidates 90·4 per cent. passed. And in 1866, out of 87 candidates, 98·8 per cent. passed. The subjects of examination, as shown by the printed results, were: First class, males:—Analysis and parsing and an essay; and also any four of the following subjects:—1. Scripture History. 2. Chemistry. 3. Mechanics. 4. Euclid. 5. Algebra. 6. English History. 7. Paley's Natural Theology. 8. The Steam-engine. First class, females:—Analysis and Parsing, Paraphrasing, to write an essay; Arithmetic, Domestic Management and Cooking, and Geography. In the other classes a lower standard of subjects was demanded, but all were required to pass in the English Language subjects. One new feature connected with the Union is the extension of the Examinations to evening schools attached to day schools, by means of a subsidiary examination, held in the beginning of April. At the first examination of this kind, held last April, 36 candidates presented themselves, and 86·1 per cent. passed in the two lowest sections in which the Council examines. The Council express a hope that this extension of their efforts may be widely adopted in the district. As regards other examinations at which the pupils connected with the Union have competed, they have been highly satisfactory. At the Examinations of the Department of Science and Art, in 1865, the pupils gained one gold medal and sixty-three Queen's prizes, of the total value of about twelve guineas. In 1866 they gained fifty-one Queen's prizes, of the value of about £10 4s. In connection with the Society of Arts Examinations during the past two years, prizes to the total value of £42 10s. have been awarded, and amongst these the late Prince Concert's prize for 1865. The certificates gained were also sixty-three in 1865, and sixty-one in 1866. In the examinations of the Lancashire and Cheshire Union, in 1865, the pupils gained five money prizes, of the value of £9, and thirty-five certificates; and in 1866 they gained five money prizes, of the value of £12 13s. 4d., and forty-three certificates. Through the organisation of the Union two young men have been educated to become science teachers, and have been certificated by the Department of Science and Art during the past two years. The paper read by Mr. Kay-Shuttleworth, on the work of the Union, is a very instructive one, and likely to be of service as relating to an organisation that has existed and work that has been done for the past ten years. The paper strongly advocates direct grants of public money to Institutions and Unions of Institutions, and urges the anomalous position of the Government in giving grants through the Science and Art Department, and refusing to do so through the Whitehall department. The success which the Union has achieved is chiefly attributed to two causes—1. The requirement of a sound knowledge of the English subjects from all candidates. 2. The employment of highly qualified organising masters as itinerating teachers and lecturers to the classes. The paper concludes by urging the carrying out of three improvements:—1. The abandonment of merely nominal subscriptions from members of Institutions. 2. The more extended establishment of small and compact Unions. 3. A liberal assistance from Government in support of the Classes of Institutions.

PARIS EXHIBITION OF 1867.

The following notice to Exhibitors has been issued:—

1. The Exhibition is to be opened on Monday, the 1st April, 1867, and the Imperial Commission will have a review of the Exhibition complete on Thursday, 28th March.

2. To enable the British department to open with punctuality Exhibitors are requested to make the following arrangements.

3. Machinery and heavy manufactures:—When foundations are required the Exhibitor must cause them to be commenced before the 5th January, 1867.

4. All heavy machinery and objects of a cumbrous nature must be deposited in the building before the 10th February.

5. Furniture and manufactures of a heavy description must be deposited in the building by the 1st March; jewellery and textile fabrics before the 10th March.

6. Exhibitors are required, either personally or by their agents, to see to the transmission and reception of their goods in the building.

7. Exhibitors must state to the British Executive, on or before the 5th January, if they intend themselves personally being in Paris to receive and instal their goods in the building, or if they intend employing an agent; if the latter, they must transmit by the same date the name and address of the agent who will represent them.

8. A list of the persons who offer their services as agents may be seen at the Paris offices at South Kensington Museum; but the Executive Commission do not undertake any responsibility whatever in the naming of agents.

9. The British Executive will mark out on the floor of the building the sites of the different allotments made to Exhibitors. Those allotments which by the 15th February are not taken possession of, will be treated as resigned, and appropriated to the purposes of the Exhibition.

10. The Executive Commission will make the floor and place the packages in their proper places, but the Imperial Commission require Exhibitors to pay all expenses of transmission and installation of their goods in the building, the storage of their packing cases, &c.

11. All packages must be labelled with the official addresses which will be supplied by the Executive Commission.

12. The offices of the British Executive will be at 71, Champs Elysées, and will be open there on the 7th January, 1867, from nine till five p.m.—By order, R. G. Wylde, *Secretary to the Executive Commission.*

RAILWAY CARRIAGES.

In writing of the Prince of Wales's visit to Moscow, the *Times* correspondent thus describes the Russian railway carriages:—

The distances travellers have to perform in this country are so immense, and the weather is frequently so severe, that the idea of giving a sort of domestic arrangement to the cars naturally occurred to a people labouring under such disadvantages. Russian railway carriages are little houses on wheels. In the first, and partly also in the second class, their interior may be described as a saloon, with all the necessaries, and some of the elegances, of such an apartment. It is furnished with looking-glasses, heated by porcelain stoves, and lit by lamps and candles. Along the sides soft divans are ranged; the middle is occupied by a mahogany table, and double windows, with red curtains, exclude not only the rude touch of the Russian air, but also the aspect of the winterly sky. The company sits or lounges about, chatting, reading, or playing cards, chess, and dominoes. The day passes pleasantly enough, and as night comes the passengers betake themselves to rest almost as comfortably as at home. By a simple process the divans are made into beds, and supplied with pillows by the attentive guard. In the first class the carriages are also provided with second stories, so to say, reached by an elegant staircase, and fitted with complete beds; in the second, if there are too many passengers to be accommodated on the divans, part of them are lodged in berths, which take the place of the rack provided in England for hats and caps. At length every one is snugly ensconced, the ordinary good wishes are exchanged, and it is night in the car. The guard and the driver only keep awake.

During the twenty hours a passenger is whirled along between St. Petersburg and Moscow the train stops twenty times at least. The stations are elegant buildings, painted red, with broad white facings round the windows and along the eaves. Without, the very picture of cleanliness—they are well-stocked receptacles of the good things of this world within. The passenger enters a large vaulted hall, scrupulously whitewashed, and paved with flags. On long tables a sumptuous repast awaits him, every plate over a lighted lamp to maintain the warmth equally necessary in this country for taste and wholesomeness. The wines and beers of every clime are represented in numerous bottles, alternating on the neatly-covered tables with steaming plates. The hall is in the bare, cold style so often met with in this country when pomp is not intended; but the viands are good, the waiters ready, and their white gloves unexceptionable. I need not say the whole affair is dear. Such luxuries as these are still regarded and paid for as exotic in this distant latitude. The station is an oasis. Round about the aboriginal race of the country lives in wooden cottages, including the whole family and their quadrupeds too, in a single room.

KRUPP'S STEEL WORKS, ESSEN, RHENISH PRUSSIA.

It may be interesting to give some idea of the vastness of these works, ranking as they do among the largest in the world, and certainly the most extensive by far of any works devoted entirely to the production of cast steel and objects manufactured therefrom. These works have gradually grown from a small factory, employing some 40 hands, and devoted then principally to making what are termed lace rolls, a speciality requiring rolls of extreme fineness of surface, as they are used for rolling out the gold wire for making bullion lace. The works have since then grown to an immense extent, and articles of a much greater variety are now produced, among which are specially, tyres, axles, springs, plates, guns, shafts for steamships, rails, rolls, &c. They employ at the present time about 10,000 men, and occupy in workshops and melting-houses, &c., nearly 500 acres of ground, of which over 50 are under roof. The dimensions of the "centre shop" are 250 feet long, 72 feet broad, and 90 feet high. This shop is furnished with a crane capable of lifting 80 tons. There are about 20 miles of railway, on which four locomotives and 150 waggons are in daily use bringing in the raw material and carrying away the finished products. In 1865 in the steel works alone, and exclusive of the blast furnaces and coal mines, there were employed 8,200 men. There were in operation in the same year 400 smelting, heating, and puddling furnaces, 160 steam engines, varying from four to 1,000 horse-power, in the aggregate 5,863 horse-power; 42 steam hammers from one to 50 tons weight, 110 smithies, and over 586 turning and other machines. There is in course of erection a 125-ton steam hammer; depth of foundation, 90 feet; weight of bed-plate, 500 tons in one casting; its estimated cost, with appurtenances, is £175,000. The consumption of coal in 1865 was over 1,000 tons; water, 200,000 cubic feet; and gas (8,000 burners), 280,000 cubic feet. The products are sent to all parts of the world, and, last year, exceeded 50,000 tons. The special work now going on at Essen is tyres and axles for railway use; and there is hardly a line in the whole world where these tyres are not running, and their great durability and consequent economy experienced. This has been evidenced recently by a set of five feet tyres running on the Great North of Scotland Railway, under a 28-ton engine, over 109,000 miles, without being tooled since they came from the maker's shops. This is considerably more than the whole life of best iron tyres. These steel tyres are made without a weld, and by a method which insures that the steel is thoroughly well worked under the hammers. The wheels of the class exhibited at Dublin were cast in one piece, and are becoming very extensively used under waggons. These works have also turned out some very large ship's intermediate and cranked shafts for sea-going steamers, which are exclusively used by the steamers leaving Bremen and Hamburg for America, the Austrian Lloyds, and other continental companies, while they are also fitted in the City of Dublin steamers, *Connaught*, *Leinster*, and *Munster*, running between Dublin and Holyhead, and also in some of the Royal Mail Steam Company's vessels.

The gun department at Essen is very extensive, and embraces nearly a fourth of the establishment. The guns are made of all sizes, for field, naval, and heavy battery purposes; both muzzle and breech-loaders. Two of the latter were shown in the machinery department of the Dublin Exhibition last year, one a nine-pounder field gun and the other a 110-pounder ship's gun. The field gun was rifled upon the French system, and the 110-pounder upon the Armstrong multigroove principle. The breech of these guns was closed by a system that was first submitted to the Ordnance Select Committee in May, 1860, and may be briefly described as follows:—The bore of the gun runs through the whole of the piece, and through the breech end; and at right angles to the bore is cut a slot, slightly tapered, and into this is fitted a wedge or valve which is used for closing the breech when firing the gun. One of the chief difficulties to overcome in breech-loading guns is to prevent the escape of gas at the breech upon the discharge, and this was overcome by Mr. Krupp in two ways—first, by means of a cup of steel, or copper, or even cardboard, that was inserted into the bore of the guns after the charge, or was attached to the end of the powder-bag. This cup, when the explosion took place, was expanded by the pressure, and completely filled out the bore of the gun, upon the same principle as the steam packing rings in pistons. This, however, involved the withdrawal of the cup each time the gun was charged, and therefore a second plan was proposed. In the face of the valve was turned a circular recess, corresponding exactly with the bore of the gun, and into this recess was fitted an angle ring, one face of which, when the valve was in its place, was in contact with the breech and the other face in contact with the side of the circular recess; so that when the gun was discharged the gas entered the circular recess and forced the two faces of the angle ring tight up against the breech and the side of the recess, and com-

pletely prevented the gas from escaping. The valve is kept in its place by a locking apparatus. This system has been very severely tested at Woolwich with perfect success, and has also been submitted to and adopted by continental governments, more particularly Russia. Guns up to 15 inch diameter of bore are made at Essen in very large quantities, but it would occupy too much space to enter into all the details of the experiments that have been carried on. Sir William Armstrong and Company are now lining a great many guns with tubes made by Mr. Krupp. The Prussians generally attribute to those guns their signal successes over the Austrians in the late war, particularly in the decisive battle of Sadowa. The government at Berlin, after the victory of Sadowa, sent to Mr. Krupp new and important orders for rifled four-pounder, six-pounder, and twenty-four-pounder cannon, all of the same kind; and Russia, convinced more than ever of the immense superiority of the new *matériel* of artillery, demands importunately that she may be furnished as soon as possible with the 350 four-pounder rifled breech-loading cannon which she ordered some time ago from the workshops at Essen. The ponderous masses that have to be handled at Essen have rendered it necessary that the dimensions of the tools should be proportionately increased, and indeed this has now become essential from the large ingots that are being daily cast. A short time since an ingot of 45 tons weight was cast to form the material portion of a 15-inch gun; and to properly forge this even the 50-ton hammer is considered too small, as it entails much longer time, and causes the ingot to be too often heated for profitable working. There is but little doubt that the steel-makers of this country are greatly indebted to Mr. Krupp for the energy he has devoted to the manufacture of steel and its application to the variety of purposes. Steel is now entirely superseding the use of wrought iron in those parts of machinery where great toughness, elasticity, and durability of wear is required. There is hardly a locomotive used which is not running on steel tyres, and the introduction of steel rails is becoming daily of more consequence. The steel produced at Essen is all melted in plumbago crucibles, and formed into the ordinary ingot moulds, this process employing a large number of men. For the large ingots of 30 and 40 tons and upwards, from 1,000 to 1,300 men are employed at one time, occupying in the casting from eight to 12 minutes. The whole of the work, of whatever shape, that is turned out at Essen is made from these ingots, which are heated and forged until the desired density and form is attained.

Fine Arts.

Mosaics: South Kensington Museum.—"Mosaic," said Ghirlandajo, "is the only painting for eternity." Some two thousand years ago it was practiced by Greeks and Romans, and now its revival is attempted by the Department of Science and Art at South Kensington. Processes which centuries ago were firmly established, revert once more to experiment, and an art all but lost has again to go through the successive stages of discovery. The mosaic pictures, eight in number, put up at Kensington, have received, for the most part, eulogy; and the experiment is so important and novel, that a critical description of the technical processes and the arts of design called into play may prove instructive. First as to process or material. The ancient methods are at Kensington revived with a difference. Early mosaics, the Roman for example, were composed chiefly of cubes of coloured stones or marbles. Our modern mosaics differ from the old in that they rely in no degree on natural substances. The cubes or tesseræ at Kensington are entirely artificial, yet in chemical composition and art aspect they are not identical. The terms used to designate the varied material are "glass," "enamel," and "ceramic," otherwise "earthenware." Dr. Salviati, whose name has been identified with the revived manufacture of Venetian mosaics, has (from cartoons) executed in the South Court, Kensington, the figures of Nicolo Pisano, Benozzo Gozzoli, Apelles and Giorgione, in materials termed "glass" and "enamel." An examination of the Salviati tesseræ, now before us, shows accordingly two distinct materials, a semi-transparent glass, used as the basis of gold, and an enamel as opaque as sealing wax. It would put the matter on a true scientific basis were a careful analysis made of these tesseræ. Will Salviati, Minton, Maw, or Powell do this for their several manufactures? Glass and enamel, however, have this quality in common, that the surface glistens and gives off light, a quality which in turn has been deemed a merit and a defect. And here is the point upon which manufacturers diverge at the present moment. Certainly a polished surface gives greater brilliancy, and the picture when viewed at the right angle is seen at a further distance; for the same reason it remains visible in a low light approaching darkness. On the other hand there are abundant disadvantages to which a dead or mat surface is not subject; such a surface is seen in the figure of Cimabue, wrought both in figure and background, by Messrs. Minton, not in glass but earthenware. Certainly the picture is less obtrusive; it can be seen without dazzle at varied angles, and so far it approaches fresco. There is another figure, that of Hogarth, which makes a compromise between the two processes; the gold background is glazed, while the figure in material ceramic or earthenware is dead or mat. This discrepancy or contrast has been specially designed by Messrs. Simpson to give decorative brilliancy to the background, and at the same time to save the figure from distracting glare of surface. The experiment is believed to be novel in the history of mosaic art. Such improvements, indeed, as Constantine and his successors made in mosaics were all on the side of greater brilliancy; and specially is it recorded by Theophilus that the Byzantians discovered a cunning process of introducing a ground of gold under a surface of glass, whereby was shed over large mosaic works a splendour before unknown. This ingenious method, still to be observed in the mosaic pictures on the façade of St. Mark's, has obtained from Mr. Ruskin warm encomiums. And the delicate mediæval process is certainly skilfully imitated by Salviati. When the modern gold glazed tesseræ are placed side by side with cubes from the façade of Orvieto Cathedral, no material difference can be detected between them. An unbroken gold background is all but an untried decorative condition in this country. But the middle ages afford a number of precedents, which may serve as guidance, such as the interior of St. Mark's, of Santa Sophia, and the ceiling in a stanza of the Vatican, painted by Raphael, in imitation of mosaics. In modern times, too, the Byzantine church of All Saints, Munich, shows a background blazing in brightest gold. For the direction of our own artists it may be useful to recapitulate the conditions essential to the right use of gold backgrounds. Such backgrounds are obviously non-natural, conventional, and decorative: the colour of the gold is intense, and requires corresponding lustre in the surrounding ornament. Such treatment necessarily implies architectonic and monumental styles. And these considerations enjoin simplicity of composition, severity in line, breadth and firmness in modelling, and decision in relief of the figure from the plane of the background. Such canons, enforced by the earliest and best examples, place mosaics in an intermediate position between bas-reliefs and paintings; and it is evident that the compositions at Kensington have been chastened and restricted accordingly. Indeed, even that degree of pictorial treatment usual to bas-reliefs subsequent to Ghiberti, seems to have been deemed inadmissible. It is true that the later mosaics on the front of St. Mark's,

allied to the school of Titian and Tintoret are flowing and free; and it is said that in the Pope's manufactory in Rome enamels of 10,000 different colours are used, so as to make the mosaics for St. Peter's *fac-simile* copies of the works of Raphael and the florid painters of the late Italian school. But such treatment, though not unpleasing to the popular eye, has been deemed out of keeping with architectural compositions. This judgment prevails at Kensington, so that only in some small accessory details is pictorial treatment seen in the cartoons, and the completed mosaics are in liberty further restricted, so that distance and perspective have been wholly excluded. In short, the treatment approaches that of the strict Greek bas-relief; in other words, the figure and action are limited to the one plane of the foreground. This is at all events safe; the practise is at least sanctioned by the best precedent; yet, in the words of Sir Charles Eastlake, the unflinching application of these strict principles to all mural decoration were an "extreme doctrine." Doubtless it may be possible to discover a just mean between opposite extremes. The cost of the Kensington mosaics has been stated at £25 for each cartoon, and £100 to £150 more for the finished work. It were interesting to ascertain what relation this cost, calculated at the square foot, bears to that of stained glass, fresco, distemper painting, and other modes of mural decoration.

New Art Club.—"The Burlington Fine Arts Club," which was constituted in the course of last season, having found a local habitation in Piccadilly, opposite to Burlington House, the future abode of the Royal Academy, will be "opened for the reception of members," in the course of a few days. The object set forth in the prospectus is "the furtherance of knowledge of art and social intercourse in general." For this end, in addition to newspapers and periodicals common to all clubs, there will be a suppy of art serials in all languages, sale catalogues, both English and continental; also arrangements are made for the exhibition of "a continued varying selection of fine works on temporary deposit, for purposes of comparison, for the acquisition of information respecting them, and as a source of general interest." Already the club numbers many of the best known names connected with the arts, and promises "a general aggregation of artistic society."

National Gallery Enlargement.—Notice has been given that application will be made to Parliament for power to purchase Archbishop Tenison's library and school, also the parochial schools of St. Martin in the Fields, and to appropriate the same for the purpose of improving and enlarging the National Gallery.

Royal Academy.—The new regulations, long under deliberation, having received the needful sanction of her Majesty, are printed and circulated, and will forthwith come into operation. They relate primarily to the number, nomination, election and power of associates. The concession is made that the limit of twenty Associates may be exceeded; the minimum is fixed at that number, but the maximum is left undefined. Thus, under this law, it will be possible to widen the area of the Academy, so as to make it commensurate with the art talent of the country. Then, as to nomination of Associates a change has been effected. It will be remembered that the old ordinance, which required a candidate to inscribe his name in a book, was regarded as needless and humiliating. This condition to election is now abolished, and in its stead a candidate will be proposed and seconded in writing by some friend in the Academy. The elections will be then made from the printed lists of all the candidates, and the votes and names of the voters may be known on demand of the majority. Associates are now, for the first time, endowed with votes, and thus vested with power. The election of Associates will take place in January, and of Academicians in June and December, of each year. Though the number of Associates may be indefinitely multiplied, the prospective right to a pension can never be vested in more than twenty at a time. This safeguard will remain for long superfluous. Other reforms already resolved upon await the accession of space which the new building will afford.

Manufactures.

Steam Engines.—The value of the steam engines exported from the United Kingdom showed a considerable advance in September, the total for that month having been £192,906, as compared with £168,304 in September, 1865, and £132,216 in the corresponding month of 1864. The increase observable in September was attributable to the augmented demand from British India and Russia. The aggregate value of the steam engines exported to September 30th this year, was £1,160,585, as compared with £1,458,842 to the corresponding date of 1865, and £1,130,341 in the first eight months of 1864, so that on the whole the demand for steam engines has declined this year as compared with 1865, although it presents a slight increase as compared with 1864. The value of the steam engines sent to Egypt has largely declined this year, the total to September 30th being only £66,285, as compared with £302,246 to the corresponding date of 1865, and £232,003 in the first eight months of 1864. The value of steam engines sent to Russia appears to have steadily increased during the last two years, the total to September 30th being £147,571, as compared with £108,129 in the first eight months of 1865, and £89,674 to the corresponding date of 1864. British India is also taking more and more steam engines, the value of the steam motors sent to that quarter to September 30th being £293,435, against £204,552 to the corresponding date of 1865, and £182,244 in the first eight months of 1864.

Manufacture of Bottle Corks.—The manufacture of bottle corks is one of the chief sources of wealth in the province of Gironde, which produces annually about 125,000 quintals of cork. To supply the demand of the manufacture, which annually consumes 155,000 quintals, 30,000 quintals of rough cork are imported, principally from Andalusia, Estramadura, and from the district of Arenys de Mar, in the province of Barcelona; 8,000 persons of both sexes are employed in this industry. Of this number 3,340 workmen are employed in cork cutting. The annual production amounts to 1,283,000 thousand bottle corks, of the approximate value of 15,500,000 frs. The raw material may be estimated at the value of three millions of francs. The most important places where this industry is carried on are San Felice de Guixois, Palafurgell, Palajos, Darnius, and Junquera.

Commerce.

Piassatoa Fibre.—This dark palm fibre, now so largely used in brush-making, is very abundant, and of superior quality, on the banks of the Rio Negro, in Brazil. The value of the exports from the province of Amazonas alone in 1864 reached nearly £5,000. At the local exhibition held at Manaos in June this year, it was shown in bundles in the form of cordage, and in brooms. The cables made of it are said to be very strong.

Commerce of the Grand Duchy of Finland.—The total value of exports of Finland amounted in 1865 to 47,899,025 marks, or about three millions sterling, namely, to the value of 15,751,835 marks by sea and 3,609,205 by land to Russia; to Norway and Sweden to the value of 3,537,511 marks. The remaining 25,000,472 marks represent the value of merchandise exported to other countries. During the same year, 1865, the total importation amounted to the value of 50,158,505 marks, of which 27 millions was from Russia. Comparing these

amounts with those of the previous year, a progress in the foreign trade of Finland may be seen. It is to be regretted that the remarkable augmentation on the importation is caused for the greater part by the scarcity which causes the Fins to seek in other markets the grain that is wanting.

Broken Leaf Tea.—The *Produce Markets Review* says:—"Immunity from prejudice is no more characteristic of the tea market than of any other branch of trade; and in this, as in other things, the habit of judging from appearances is sometimes carried to a great excess. Not that the habit of so judging necessarily leads to erroneous conclusions; but articles should not be condemned for looks alone, when other tests can be applied. The value of a tea is determined not only by the liquor which is produced by infusion, but also in a great measure by the appearance of the leaf previously—that is, its size, form, and colour. Experience teaches that these three are generally associated more or less with the quality of the tea itself; and hence it comes that the value of the article is determined almost as much by these three incidental considerations as by the quality of the tea after infusion, which is after all the most essential of any. Retail tea-dealers are apt to lay a great deal of stress on the secondary qualifications, because the public, as a rule, will not buy teas with ill-formed leaves, or containing much dust. We make these remarks because we think that if grocers drew their customers' attention to the fact that teas of an unprepossessing appearance were not necessarily bad in quality, there would be no great disinclination to give those kinds a trial, the lessened value of which is caused by a defect in the appearance of the sample. At the present moment there is on the market a quantity of broken-leaf, or dust, which retailers might be inclined to overlook simply on account of its appearance, but which is to be obtained of a quality, in many instances, of the finest description, although sold at less than the price for common Congou. That this is the case with a great proportion of the broken leaf tea on offer we are not prepared to assert; but in several instances that have come under our notice not only is the quality better and the flavour more agreeable than that of many other teas, for which three times as much money has been paid, but the second liquor is almost, if not quite as good as the first. And the reason of this is obvious. The boiling water acts directly upon the small fragments of leaves, instead of being retarded (as is the case with larger leaves) in its action by first unfolding the leaf, and then extracting the theine from it. By the time that the leaf in ordinary samples of tea is fully unrolled, and capable of being submitted to the action of the hot water, the liquid has lost a considerable amount of its heat, and the essence of the tea-leaf is consequently but imperfectly extracted. The only objection to the use of the broken leaf is that the particles of the leaves are apt to flow with the liquor into the cup, but this may be remedied by a little care in pouring the tea out."

Coast Semaphores and Telegraphy.—The semaphores erected on the coasts of France have just been placed at the service of the commercial world. These semaphores being in relation with the whole telegraph system of the empire, captains of ships may now make known their wants, send orders, and receive instructions and news without the necessity of entering ports or harbours, or even of quitting their course for shallow waters. Elaborate instructions have been drawn up by the Ministers of the Interior and of the Marine, and sent to all the ports and chambers of commerce in France, for the regulation of the working of these coast telegraphs, the signals used being those laid down in the code of commercial signals for all the world, drawn up by a commission appointed by the English and French Governments conjointly, and approved and adopted by Belgium, Italy, Spain, Portugal, and some other powers. A system and code which, when completed, will place the ships of all the world in direct communication with the territory of every nation, is certain of universal adoption. The English Government is now establishing semaphores along our own coasts on the same plan, and in connection with the same system of signals.

Colonies.

North Australian Exploration.—It appears that Mr. M'Kinlay, who was sent out on the experiment of settling North Australia, and to discover a more suitable place for colonisation than Adam's Bay, has returned to Melbourne without accomplishing any part of his task. The expedition started in the tropical rains, and men, horses, and all had a narrow escape of being washed away. They had not travelled a hundred miles from Escape Cliffs before they were surrounded with water. They were unable to proceed, and their retreat was cut off. In this medley a boat had to be extemporised, and the whole party descended the East Alligator. They returned to Adam's Bay, after having lost everything, and having barely saved their lives. With this return of the expedition it is supposed there will be a thorough collapse of the North Australian colonisation scheme, but the Colonial Government appear to be bound by Act of Parliament to take further steps to put the purchasers of the land in possession.

Gold Mining in New South Wales.—A bill, entitled "The Gold Fields Regulation Bill," has been passed by the Colonial Legislature. Its object is to give an impetus to gold mining by offering encouragement to capitalists, and to secure the public revenue by making it incumbent on every miner to take out a miner's right. Hitherto the gold mining operations in the colony appear to have been exceedingly tardy, and it is thought that this has been caused by, in some degree, the nature of the gold fields regulations. It is now proposed to grant leases of auriferous tracts, of from one to 50 acres on level ground and quartz reefs, and from 200 to 1,000 yards of river beds, for a period not exceeding 15 years, at £2 per acre, or £2 per 100 yards. There is plenty of gold beyond the reach of the individual miner, which can be readily and profitably obtained by associated capital and labour, and one of the objects of the Government is to encourage the formation of companies under the Limited Liability Act passed several sessions ago. This measure contemplates the abolition of all restrictions as to the mode of working, to allow each lessee to do his own work in his own way, without the intervention of local courts. There are no special provisions in regard to foreigners; the word "alien" has no place in the bill. In the course of a year or two the export duty on gold will be repealed. The necessity for this step is caused by an Act passed last session by the Parliament of Victoria, reducing the duty in that colony from 2s. 6d. to 1s. 6d. per ounce for the rest of this year, to 6d. in the year following, and bringing about its total abolition at the end of the year 1867.

Improvement of the River Murray.—The clearing away of obstructions to navigation in the River Murray is being carried on with vigour. For about 370 miles above Blanche-town the stream is perfectly free from impediment. The Murrumbidgee has been navigated for a considerable distance lately, and residents in the locality are desirous of having the river cleared of snags and sandbanks, in order that it may be traversed by vessels from a considerable distance inland. Were the stream cleared, great benefits would accrue to the squatters in those districts.

Obituary.

Gavarni, the famous French caricaturist, died recently at his residence at Auteuil, near Paris. He was not very old, but had for some years been in bad health,

and lived a very retired life. The name of Gavarni is little known to the young generation of the present day, but his popularity some years since was deservedly great; his power of catching the peculiarities af various classes and eccentric individuals, and embodying them in an irresistibly droll manner, was extraordinary. He lived in England for several years, and his publication, entitled *Gavarni in London*, was a great success; and although he never quite succeeded in drawing English forms and faces, his caricatures of our eccentrics are full of observation and humour, and will always form a valuable volume of historical curiosities. "Punch," the "Acrobats," and the "Baked-potato Man," are amongst the most successful of Gavarni's English sketches, and the works of his pencil have supplied the foundation for thousands of caricatures of the English by some of his countrymen, who have produced innumerable variations of his designs without understanding the features which he had studied and fixed on paper with the seal of his genius.

Forthcoming Publications.

The Mechanician and Engineer's Instructor. By Cameron Knight. (*Spon, Bucklersbury.*) A new illustrated work on mechanical engineering, to be completed in 24 monthly parts, of which Part I. will be issued on the 1st of January. The subjects treated will include forging, planing, lining, slotting, shaping, turning, screw cutting, &c.

Notes.

Museum of Science and Art at Bethnal Green.—The Government have determined to propose to Parliament the establishment of a Museum of Science and Art in the east of London; and a committee has been formed to secure the necessary ground, which has been obtained in Bethnal-green. It is intended to accommodate the superfluous specimens which overcrowd all our national museums.

Road Locomotive.—A Lausanne paper states that a road locomotive, constructed on a system invented by M. Schmidt, is now in constant use in the neighbourhood of Zurich, and is remarkable for the ease with which it ascends considerable inclines, drawing after it carriages containing as many as forty passengers. It is said to be easily guided, and that its pace may be regulated with great facility; it may also be very quickly stopped.

Artificial Nests.—The *Bulletin de la Société d'Acclimatation* states that artificial birds' nests are now made in Switzerland under the direction of the societies formed there for the protection of insectivorous birds. One of the members of a society of this description, who inhabits Vevey, having observed that many species of that kind select for nests the holes they find in the trunks of rotten trees, and that they consequently do not find it easy to settle in orchards, where all the trees are in good condition, began, twenty-five years ago, to set up rotten trunks in his grounds; and since then he has had no need to trouble himself in the least about clearing away caterpillars, that care being entirely left to his winged guests, who perform their duty admirably. His neighbours, on the contrary, who have not had this foresight, have had their orchards laid waste by a host of voracious insects. The Yverdun Society have gone the length of placing artificial nests even in the public walks and communal forests, on the borders of the lawns, &c. All those nests are now inhabited by hedge-sparrows, redstarts, creepers, and tomtits, all which may be found in Switzerland as high up as the perpetual snow line. The same practice has found its way into Germany.

French African Exploration.—A general subscription is set on foot in Paris to supply funds for the exploration of Africa, proposed to be undertaken by a young officer, M. Le Saint, whose views are supported by the Geographical Society of France. M. Le Saint proposes to ascend the Nile as far as Khartoum, in Nubia, then to diverge towards the south, mount by the river of the Gazelles, and make for the heart of the country of the Niam-Niam. Should he succeed in this, he will afterwards direct his steps westward, and try and reach the French settlement of of Gabon, on the coast of Guinea. Amongst the conjectures of geographers, which it is hoped M. Le Saint will succeed in verifying, are the supposed existence of a great lake between the Albert Nyanza and the Atlantic Ocean, and of a chain of mountains separating the interior basin from that of the Gulf of Guinea. Another point is to seek for the sources of several large streams which fall into the Gabon. The minimum sum said to be necessary for this adventurous undertaking is only £600, and there is no doubt that much more than that will soon be obtained.

Society of Acclimatization in South Africa.—An acclimatization society is now established in the English colony of Natal. According to the programme recently published, the intention of this institution is the introduction, acclimatization, and domestication of animals and vegetables, both useful and ornamental, that do not exist in the colony, and to propagate indigenous breeds and products in countries where they are not known. This new society seems to be most favourably situated to facilitate the work of like societies in Europe. The colony of Natal, but yet little inhabited, is situated at the extreme limit of European possessions in South Africa, and it is in this region that the animals driven back by the progress of colonisation have taken refuge.

Correspondence.

The Electric Telegraph.—Sir,—It may interest many connected with telegraphy to know that a few copies of the remarkable pamphlet on this subject, entitled "Description of an Electric Telegraph, by Francis Ronalds, 1823," may be still obtained from Mr. Spon, of Bucklersbury. Mr. Ronalds himself is also still living at Battle, in Sussex, and his portraits may be obtained from Messrs. Maull and Polyblank. His pamphlet is one of very great interest, and well worth reading.—I am, &c.,

L. C.

London, 23rd November.

Artificial Quinine.—Sir,—It would be exceedingly interesting to your readers in general, and to chemists in particular, if Mr. W. L. Scott would favour us with a further communication describing more particularly the artificial quinine, of which he claims the discovery. I saw the small specimen exhibited at Nottingham, where, of course, it excited great curiosity. The discovery has hitherto evaded the constant research of our greatest chemists, and its results would be so important to mankind, that I cannot understand anyone laying it aside, "owing to the pressure of other matters." In addition to a large reward offered to the successful discoverer by the French Government, an immense fortune would be rapidly acquired by any chemist who could, as Mr. Scott believes, "eventually produce a ton of artificial quinine, at a cost not exceeding the present price of half-a-hundredweight of the principle now extracted from the bark of cinchona." Although Mr. Scott significantly assures us that "a few grains" have cost him "two years' labour and considerable outlay," the fact of having produced it at all artificially would be the greatest achievement of modern chemistry. Hoping he may be induced to publish further particulars,—I am, &c.,

Edw. C. C. Stanford, F.C.S.

1, Holyrood-crescent, Glasgow.

MEETINGS FOR THE ENSUING WEEK.

MON. ...Royal Inst., 2. General Monthly Meeting.
Odontological, 8.
R. Asiatic, 3.
Entomological, 7.
Society of Engineers, 7. Mr. Arthur Jacob, "On Reservoirs and Embankments."
British Arch tects, 8.

TUES. ...Civil Engineers, 8. 1. Discussion on Mr. Fox's Paper, "On Light Railways." 2. Mr. W. H. Preece, "On the best means of Communicating between the Passengers, Guards, and Drivers of Trains in Motion."
Anthropological, 8.

WED ...Society of Arts, 8. Mr. John Irwin, "On the Trade in Foreign Cattle."
Geological, 8. 1. Mr. J. C. Hawkshaw, "Geological Description of the First Cataract, Upper Egypt." 2. Dr. P. Martin Duncan, "On some Echinodermata from the cretaceous rocks of Sinai." 3. Mr. J. Curry, "On the Drift of the North of England."

THUR ...Royal, 8½.
Antiquaries, 8.
Linnæan, 8. 1. Dr. Cobbold, "On *Distoma clavatum* from a Sword fish." 2. Dr. Masters, "On the Morphology of the *Malvaceæ* and allied orders."
Chemical, 8. 1. Mr. E. T. Chapman, "Synthesis of Formic Acid." 2. Mr. James Parkinson, "Alloys of Magnesium."

Patents.

From Commissioners of Patents' Journal, November 23rd.

GRANTS OF PROVISIONAL PROTECTION.

Artificial fuel—2851—J. Roberts.
Axle-boxes—2912—J. S. Cooke.
Barrels, bungs and taps for—2906—J. K. Heywood.
Bituminous substances, treating—2788—C. McBeath.
Boats, lowering—2952—D. Murray.
Book-keeping, apparatus for teaching—2980—H. A. Bonneville.
Boots and shoes, cleaning by machinery—2800—H. Churchman and F. Braby
Boring engines—2922—F. B. Dœring.
Bottles, stoppering—2833—J. Becker.
Bottles, uncorking—2766—A. Manuel.
Breech-loading fire-arms, and cartridges—2946—W. Clark.
Bricks—2950—W. Pidding.
Brushes—2812—F. Brown.
Call bells—2852—E. Tonks.
Carding engines—2794—S. Faulkner.
Casks, cleansing—2846—O. C. Edwards.
Chain links, bending—2834—H. R. J. Denton.
Chloride of sodium, decomposing—2768—W. Weldon.
Coal oil lamps—2958—A. V. Newton.
Coffee hullers—2928—H. A. Bonneville.
Composing and printing machines—2770—N. H. Loomis.
Core bars—2914—T. Horsley and G. Knighton.
Cupreous pyrites, treating waste solutions obtained from burnt—2858 F. Claudet.
Electric telegraph apparatus—2874—T. Walker.
Fabrics, treating—2972—W. Clark.
Fibres, combing—2832—E. Tavernier and H. W. Whitehead.
Fibrous materials, doubling—2968—J. Hading.
Fibrous materials, preparing—1814—W. Walker.
Fibrous materials, preparing—2831—W. S. Ashton and J. Johnson.
Fibrous substances, spinning—2890—J. Combe.
File-cutting machines—2944—J. H. Johnson.
Fire-arms—2882—T. H. Ince.
Fire arms, breech-loading—2878—T. Hunt.
Fire arms, breech-loading—2970—J. G. Tongue.
Fire, automatic apparatus for giving warning of—2862—J. S. Gisborne.
Fire-escapes—2784—W. R. Barnes.
Fire-escapes—2816—J. Scott.
Galvanic batteries—2836—O. Rowland.
Gas—2756—H. Phillips.
Gas retorts—2827—J. J. Holden and S. J. Best.
Gas stoves—2903—J. Thomson.
Gloves—2844—R. Porter, jun.
Grain, preserving—2798—J. H. Johnson.
Hats—2703—J. Haworth.
Hay and chaff cutting machines—2845—J. Howell.
Houses, &c., cleaning—2904—W. E. Newton.
Hydraulic presses—2792—R. H. Tweddell.
India-rubber thread—2966—C. Moseley.
Invisible photographs, developing—2641—W. Grune.
Iron and steel, casting—2940—N. Korshunoff.
Iron, refining—2948—G. Crawshay and J. Thomas.
Iron safes—2856—J. Chubb and W. H. Chalk.
Jewellery—2786—T. Tubino.
Labels, protecting—2106—W. C. Gibson.
Lamps—2778—E. Howard.
Lamps—2828—J. H. Johnson.
Magnetic compounds—2886—W. Darlow and P. W. Seymour.
Metallic band fasteners—2790—J. H. Johnson.
Metallic bedsteads—2964—D. Brierley.
Metals, casting—2764—J. Fisher.
Metals, rolling—2874—J. H. Johnson.
Metal tubes—2762—P. A. Muntz.
Milling machinery—2804—J. Wilkinson, jun.
Motive power—2353—F. G. A. Horstmann.
Multiple drilling machines—2982—W. Clapperton.
Nails—2942—J. G. ongue.
Needles, papering—2835—M. Pollack.
Paper, cutting—2808—H. M. Nicholls.
Perambulators—2782—C. Tiffin, jun.
Pill-making machines—2854—R. McTaggart and J. Holdforth.
Pneumatic signal apparatus—2818—J. Scott.
Puddling—2866—C. E. Brooman.
Puddling furnaces—2857—J. Player.
Pumps—2842—S. Holman.
Railway signals, &c.—2838—J. Deas and R. C. Rapier.
Railway trains, communication between the guards, engine-drivers, and passengers in—2880—C. E. Spagnoletti.
Railway trains, intercommunication between the several parts of—2849—J. G. Tatters.
Reading-desks—2853—E. P. North.
Reaping machines—2543—E. P. Lane.
Reflectors and ventilators—2841—G. Watson.
Rivers, preserving the banks of—2910—W. E. Gedge.
Rivetting presses—2780—G. Davies.
Safes—2894—W. Goodbrand and T. E. Holland.
Saw mills—2837—W. Geeves.
Screw-bolts and nuts, fastening—2826—J. Patterson.
Screw nuts—2870—E. H. Bentall.
Screw stocks and tube cutters—2840—T. Chatwin.
Self-acting mules—2814—W. Robertson.
Sewing machines—2617—J. Warwick.
Sewing machines—2829—T. Henderson.
Ships' anchors—2938—J. F. Caulkins and W. J. Armstrong.
Ships' anchors, lowering—2830—J. Jackson.
Ships' boats—2776—T. S. Simpson.
Ships, propelling—2157—G. Carter.
Slide valves—2902—E. S. Hindley.
Smith's fires—2843—W. Frost, J. H. Leather, and J. Nelson.
Spinning machinery—2888—J. Shaw.
Steam boilers, feeding water to—2802—J. Varley.
Steam engines—2934—G. White.
Substances, cutting—2954—W. Routledge and F. F. Ommanney.
Substances, sculpturing on—2960—A. Hawkins.
Surfaces, coating—2850—R. J. Gay.
Textile fabrics, printing—2872—A. Grote.
Thread and yarns, finishing—2962—H. and J. Crawford.
Threads and yarns, polishing—2868—P. Kerr.
Travelling ovens—2737—G. Haseltine.
Vacuum air engines—2824—W. E. Newton.
Valves—2884—W. Bracewell, W. Pickup, and B. Lund.
Varnished or japanned fabrics—2795—J. Thorpe.
Vegetable substances, separating—2774—F. Crossly.
Vegetable substances, treating—2924—W. E. Newton.
Vessels, unloading—2839—H. Greaves.
Wall papers, pasting—2758—D. McDermid.
Water closets, &c.—2920—S. W. Woodroffe.
Weaving, looms for—2820—J. Keighley.
Weaving, looms for—2822—R. Holden.
Weaving, looms for—2918—D. and D. Crighton and W. Donbavand.
Weaving, looms for—2978—J. Whitehead.
Woollen garments, finishing—2936—F. B. Donisthorpe.
Woven fabrics, finishing—2896—J. E. Browne.
Woven fabrics, stretching—2956—J. Bentley and W. Hampson.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Forks—3043—G. Haseltine.
Spring regulators—2376—J. F. Belleville.
Weaving, looms for—2990—W. R. Lake.

PATENTS SEALED.

1460. J. Emme.
1462. W. Gibson and E. Ellis.
1481. G. Spencer.
1491. J. Hall.
1507. G. T. Bousfield.
1535. S. Turton.
1552. D. A. Dumuis, J. F. Flicoteaux, E. W. Niblett, and M. L. J. Lavater.
1570. A. Grivel, jun.
1626. L. A. de Milly.
1859. L. Mignot.
1959. J. Adams.
2146. J. Whitworth.
2191. J. O. York.

From Commissioners of Patents' Journal, November 27th.

PATENTS SEALED.

1473. S. J. Boyle.
1479. R. Canham.
1489. T. Woodward & G. Fallows.
1497. R. B. Boyman.
1498. F. Hewitt.
1505. W. Bayliss, jun.
1509. G. P. Evelyn.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

2901. I. Francis.
2906. R. and J. S. Walker, and B. Brown.
2940. M. B. Westhead.
2955. J. Lewis.
2958. W. E. Newton.
3013. H. Lumley.
2975. J. Nadal.
2978. J. A. R. Main.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

2623. A. Godchaux.
2757. F. Coignet.
2668. T. Carr.

Journal of the Society of Arts.

FRIDAY, DECEMBER 7, 1866.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'clock:—

December 12.—"On Old London: its Streets and Thoroughfares." By J. G. Crace, Esq.

December 19.—"On the Study of Indian Architecture." By James Fergusson, Esq., F.R.S. On this evening Sir James Fergusson, Bart., M.P., will preside.

Cantor Lectures.

The first course of Cantor Lectures for the present session will be "On Pottery and Porcelain," and will be delivered by William Chaffers, Esq. It will consist of six lectures, and will commence on Monday evening, the 21st January next, and be continued on succeeding Monday evenings.

The second course will be "On Music and Musical Instruments," to be delivered by John Hullah, Esq. Arrangements for a third course are in progress.

The lectures will commence each evening at eight o'clock, and are open to members, each of which has the privilege of introducing one friend to each lecture.

A new list of members of the Society has been printed, and any member can have a copy sent to him on application to the Secretary.

Subscriptions.

The Michaelmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Third Ordinary Meeting.

Wednesday, December 5th, 1866; Clare Sewell Read, Esq., M.P., in the chair.

The following candidates were proposed for election as members of the Society:—

Bentley, James, Woodgreen-park, Cheshunt.
Dyke, William Hart, M.P., Lullington Castle, Kent.
Nicholson, William Henry, St. Margaret's, Rochester.
Poole, William, Hentland, Ross, Herefordshire.
Rowley, James Campbell, 2, Clarence-buildings, Booth-street, Manchester.
Russell, T., Stubbers, Romford.
Wainwright, James Gadesden, Clapham-common, S.
Williams, John Carvell, Everdon-house, Surbiton, S.W.

The following candidates were balloted for, and duly elected members of the Society:—

Aston, J. Wood, Cradley, near Birmingham.
Bellows, John, Steam Press, Gloucester.
Birt, William Jacob, 23, Sussex-gardens, Hyde-pk., W.
Bond, John James, 39, Queen Anne-street, W., and Public Record Office, E.C.
Bosanquet, Horace Smith, Broxbournebury, Hoddesdon.
Bradley, Lonsdale, Prior's House, Richmond, Yorkshire.
Brett, Jacob, Portland Hotel, Great Portland-street, W.
Bryceson, Henry, Brook street, Euston-road, N.W.
Carr, Jonathan, Twerton Mills, Bath.
Clarke, Samuel, 110, Albany street, N.W.
Clay, Rev. Walter L., M.A., 30, Harewood-square, N.W.
Colls, Benjamin, 28, Moorgate-street, E.C.
Cooke, William, 12, Friday-street, E.C.
Dixon, John, 5, Abchurch-yard, E.C.
Ferguson, Robert, Morton, Carlisle.
Ferrabee, James, Port Mill, Brimscombe, near Stroud, Gloucestershire.
Freeman, John, Woodland House, Falmouth.
Gill, Henry Septimus, Tiverton.
Harrison, J. S., F.R.C.S., Lancaster.
Henry, Sir Thomas, 23, Hanover-square, W.
Hill, William, jun., 60, Bishopsgate-street-within, E.C.
Hynam, John, 7, Wilson-street, Finsbury-square, E.C.
Ince, Joseph, 26, St. George's-pl., Hyde-pk.-corner, S.W.
Lambert, William, 4, New Basinghall-street, E.C.
Layton, Charles Edwin, 150, Fleet-street, E.C.
Le Braithwaite, Charles, Jun., Kendal, Westmoreland.
Mair, Robert H., 65, Ludgate-hill, E.C.
McNeill, James, 35, Hopeton-street, Belfast.
Murray, Robert, Kinnahaird, Dingwall, Ross-shire, N.B.
Naylor, William, Manor-place, Paddington-green, W.
Patalano, Enrico, 5, Laurie-pl., Percy-cross, Fulham, S.W.
Perry, Joseph John, 37, Red Lion-square, W.C.
Phillips, Charles Thomas, Windsor.
Pols, John A., 26, Bucklersbury, E.C.
Pugh, Edward, Wrotham House, York-rd., Holloway, N.
Richardson, John, Tutbury, near Burton-on-Trent.
Sanguinetti, Francis B., 63, Jermyn-street, S.W.
Shields, John, Durham.
Slater, James A., 23, Denmark street, Soho, W.C.
Sorby, Thomas Charles, 27, Brunswick-square, W.C.
Strutt, The Hon. Arthur, Milford, near Derby.
Tonks, William Henry, Moseley-street, Birmingham.
Trewby, William George, Coburg-house, Waterloo-rd., S.
Watts, Isaac, Cotton Supply Association, 1, Newall's-buildings, Manchester.
Williams, Oliver John, Harwich.
Young, H., 16, Carthusian-street, Aldersgate-st., E.C.

The Paper read was—

TRADE IN FOREIGN CATTLE.

By John Irwin, Esq.

The serious losses of cattle which have been sustained in this country by the rinderpest since June, 1865, having attracted considerable attention to the foreign cattle trade, I propose to discuss the system pursued in supplying the London cattle market with foreign stock; and although the subject is one which I fear can scarcely be made very interesting, it is of such vital importance that it may not be unworthy of a little consideration in some of its leading features.

The supply of food to large cities, especially to London, is a subject of such deep moment that very great care should be observed in attempting any radical change in the system which has been in practice for a lengthened period, the disturbance of which might lead not only to great pecuniary loss and much inconvenience, but also to the disadvantage of at times being without an adequate meat supply. I am fully aware that in the opinion of some, who are perfectly conversant with the subject of both foreign and home supplies of cattle, the contingency

of having very little, and sometimes absolutely no meat fit for consumption in the London market, is not provided for by consignments from the Continent of Europe, but by the home-fed stock; on the other hand, I understand that the school to which I allude has the greatest faith in the doctrine that we should be richer, not only in the number, but in the purity of our herds, if we had never imported a single foreign animal. That the doctrine may be correct I am not prepared to controvert, but I conceive the principle as laid down to be purely theoretical, beyond the scope of actual test, and one of many questions which serve for much unnecessary as well as unprofitable discussion.

Why the foreign stock should, in the minds of thousands of our agricultural population, be placed under a species of ban, I cannot understand, unless it is that the importation prevents the high prices which would inevitably have ruled had we not been permitted to resort to our neighbours, and avail ourselves of such surplus quantity as they can afford to send us; for although it has become almost an accepted fact that the cattle plague, of which we are now happily all but free, was brought to us from abroad, I cannot find any direct evidence to that effect, neither can I trace any bearing on the direct importation of either pleuro-pneumonia or foot and mouth disease, much anterior to both diseases being well known as existing in England and also Ireland; and as far the rinderpest is specially concerned, the Royal Commission of 1865 failed to establish anything conclusive as to direct importation; and the veterinary authorities, to whom we look for a satisfactory solution, are even now undecided, and, what is not unusual, very far from undivided in their opinions on the subject.

With a peculiarity essentially English, the rinderpest, when it first broke out, was at once pronounced to be a foreign importation—that, at all events, was agreeable to our notions of purity in our own herds, and, luckily for the theorists, the Revel cargo had been in the Metropolitan Cattle Market some few days prior to the disease having been first observed, so that it was concluded, as a matter of course, that our alleged first direct Baltic importation had subjected us to the ravages of a terrible scourge. Granting that the opinion of an eminent veterinary authority is indisputable, viz., "that the first time cattle should be introduced direct from countries east of a line from about Memel on the Baltic to Trieste on the Adriatic, we should undoubtedly have the steppe-murrain, or cattle-plague," I am at a loss to understand how we have escaped the pestilence for so many years, for the Revel cargo was not the first direct importation from Russia *viâ* the Baltic, but the third, though not in such large quantities; and although the Royal Commission in their report seemed to attach no importance to the theory of the Revel cargo having done the mischief complained of, it may be as well to state that some 10 or 12 years ago a quantity of cattle from St. Petersburg was landed at Hull, and, I believe, sent into Lincolnshire; a second direct importation was brought to London in 1860 from St. Petersburg, the cargo from Revel being the third instance—part of the latter having been sold in the Metropolitan Cattle Market about the 2nd June, 1865, and, coincidentally, the disease was first observed some 17 or 18 days after, on or about the 19th June, and, subsequently spreading, had by the 14th October extended to 29 counties in England, 2 in Wales, and 16 in Scotland, and was still advancing; the early cases in the provinces being said to have been traced to cattle which had been exposed in the Metropolitan market for sale, a noteworthy circumstance, inasmuch as part of the Revel cargo was sold at Hull, and thence sent to Manchester and other places, whence no Rinderpest was said to have been communicated to the adjacent districts. In the meantime, the disease had been imported into Holland—also by cattle sent from the Metropolitan market—whence it spread to Belgium and France, but in the two last-named countries the stamping-out measures which were at once put in force had the effect of preventing any alarming spread, whereas the temporising policy permitted in Holland and Great Britain, has had a most disastrous effect, some of the Dutch provinces still suffering severely.

On this subject I will submit for your consideration the only evidence pertinent to the matter given before the Royal Commission, on which any reliance can be placed, which tends to uphold the supposition that we received the disease in question by the Revel cargo.

Professor J. Gamgee was asked the following questions:—

"2801. Referring to the Revel cargo, you stated at the Social Science meeting that three or four of the cattle were slaughtered?—Yes, at Revel; and one died at Revel; and another, I understood, was sick on the voyage."

"2802. The impression left on my mind was that you wished to say that those animals certainly died of the rinderpest?—That is my impression."

"2803. You have no authentic information upon that point?—Yes, I have, if it can be relied upon, from the man who had the cattle."

It appears, therefore, that Professor Gamgee had no reliable information on this subject, unless he could believe the man who had the cattle; and after that confession, it will be as well you should hear the letter from the "man who had the cattle," addressed to Messrs. Honch and Co., the importers of the cargo. I conclude the Professor in the evidence quoted alludes to the person sent over by the importers, as in previous questions put to him (Nos. 2643, 2644) he specially mentions him. In his letter, dated London, 3rd January, 1866, this person says:—

"I desire to express my sincere regret that I should have circulated any rumour as to your having imported cattle from Revel which were suffering from the disease called the rinderpest. Such was not the fact.

"During my stay of seven months in Russia, in the years 1864 and 1865, I found no cases of the so-called rinderpest in Esthonia, the province in which I purchased the cattle, which were shipped by me to you in England, by the steamer "Tonning." I accompanied that cargo of cattle, and saw them landed at Hull. They were all perfectly healthy, with no symptoms of any disorder. There was one sick on board, but it subsequently recovered, and was was sent up to London and sold."

Before leaving the subject of the rinderpest I would draw your attention to the evidence recently given to the Royal Commission, establishing the fact of the existence at various times of some plague among cattle in England, analogous to, if not identical with, the steppe murrain or rinderpest; and it is also a strange circumstance, that in 1348-9, after the "black death" had produced great mortality among men, a grievous plague attacked cattle, which perished by thousands, whereas in 1865 the converse took place, for we had in that year the murrain among the cattle, which also perished in thousands, and, as you all know, this year has witnessed our being subjected to great losses amongst men from cholera. It is a question for those more skilled in the science of contagious diseases, as affected by peculiar conditions of atmosphere, to determine how far such a coincidence may be accounted for, but it has left an impression on my mind that in attempting to establish the theory of direct importation, we may be pursuing a fallacy, and in so doing lose valuable time in arriving at correct conclusions. To all who are desirous of thoroughly clearing up the doubt as to how we could have harboured so dreadful a pestilence, I would recommend a careful perusal of the three reports issued by the Royal Commission appointed to inquire into the nature and origin of the cattle plague, for they are well worth the consideration of every one interested in the supply of good cheap food to great Britain, and especially so to towns

where there are large communities of poor people to be fed,—by poor people I mean those who can only afford to buy beef or mutton when it is at a reasonably low price, proportionate to the scale of wages paid.

That the necessities of our meat supplies have rendered it incumbent on us to resort to continental Europe is as self-evident as the fact of our having to go abroad for cheaper bread than we can produce at home. Theorists may say what they like as to how much beef and mutton we could produce when left to ourselves, and uncontaminated by foreign importations, but there is the fact beyond controversion that we find it expedient to purchase from the foreigner, and that we now have beef and mutton from abroad, if not quite equal to our own, very little inferior, and at a price which enables more to partake of a good meat dinner than ever the British farmer could manage to provide when left to himself.

In 1842 the importation of cattle from abroad was strictly prohibited. In 1843, however, they were allowed to be imported on payment of duty, which was found to be so high as to afford little or no margin of profit to importers, considering the prices realized abroad, and, bearing in mind the risks of the trade, which consist of the possible loss of market on arrival here, and consequent extra expense, as well as depreciation of value, apart from the sea risk of the voyage, which, if protected by marine insurance, adds a heavy additional item of expense, and does not even then cover all the casualties of the voyage. With regard to the opinion in England in 1842-43, when importations were allowed, it will be worth my drawing your attention to the following extract from M'Culloch, as showing the feeling prevalent, and the anticipated result of the measures alluded to by him. Under the head of "Importation of Cattle," he says:—

"Previously to 1842 the importation of horned cattle, sheep, hogs, and other animals used as food, was strictly prohibited, but this prohibition was then withdrawn, and the importation of the animals in question permitted, on paying a duty of 20s. a head on oxen and bulls, 15s. on cows, 3s. on sheep, 5s. on hogs, &c. This certainly was one of the most important inroads that has ever been made on the prohibitive system, and reflects the greatest credit on the administration of Sir Robert Peel. At the same time, however, the benefits of the measure are rather of a prospective and negative, than of an immediate and positive description. It will most probably lead, in the course of time, to a considerable importation, and it will, no doubt, prevent or be a great obstruction to any oppressive rise in future in the price of butchers' meat in this country, but we doubt whether it will do more than this. The apprehensions which the measure, when proposed, excited amongst the agriculturists, and the panic it occasioned, were wholly destitute of any good foundation; and the fact that the price of cattle is lower now (1843) than before the repeal of the prohibition is not, assuredly, owing to the inconsiderable importation that has taken place, but to the fact of their price having previously been quite exorbitant, and to the diminution of the consumption of butchers' meat in a large portion of the country, originating in the depressed state of manufactures in 1842 and in the early part of 1843. Indeed, we believe that their price would have been quite as low at this period (June, 1843) as it really is, had the prohibition continued in full force.

"The fact is that, low as the duties are, very few cattle can be imported into England, nor is there any such discrepancy as is commonly supposed between the prices of butchers' meat here and on the Continent. No doubt the rates at which it is quoted in the markets of the latter are, in the great majority of instances, a good deal below its price in London and other great British markets, but this difference is in great part apparent only, and depends on the superior quality of English butchers' meat, as compared with that of other countries.

"There is an immense variety in the breeds of the continental cattle; but, with the exception of the cattle of Holstein, the beef of those in Western Europe is universally inferior to that of England; and the continental mutton is hardly eatable. In most parts of the Continent the object is to have a fine fleece, with but little regard to the carcase; whereas in England the carcase is an object of more importance than the fleece.

"Denmark, including Holstein, exports annually from 25,000 to 30,000 head of cattle, principally to Hamburg and Altona, and there could be no reason for supposing that the repeal of the prohibition against importation in this country should lessen the demand for beef in Hamburg otherwise than by raising its price. Inasmuch, however, as the beef of Holstein (which is principally cured and smoked) had hitherto sold in Hamburg for from 4½d. to 5d. per lb., or at but little below the cost of beef in England, it was evident that a comparatively small increase of price would suffice to prevent its exportation. And this in truth is precisely what has happened; for it has been found that when to the cost of cattle in Hamburg has been added the cost of their conveyance and sale to the butchers in England, amounting to at least 40s. a-head, and the duty of 20s. a-head, their price has been such that they could rarely be sold in London with a profit, and their importation has hardly been worth notice.

"But, if we except Denmark and Ireland, no country of Western Europe has hitherto been in the habit of exporting cattle. France exports a few, but her imports always overbalance her exports; and it is probable, indeed, should no change be made in the policy on which she has been acting of late years, she will cease to export a single animal. The truth is, that there has latterly been a great increase in the price of butchers' meat in France, and a material decrease in the stock of cattle in that kingdom, occasioned by the excessive additions made to the duty on the importation of cattle. Previously to 1814, all sorts of cattle might be imported into France duty free. In that year, however, a duty of three francs (2s. 6d.) a head was laid on their importation; and had the duty been allowed to continue at this reasonable rate, it could not justly have been objected to. But in 1822, this moderate duty was suddenly raised to the enormous amount of fifty-five francs, or 44s., and the result has been that, in the interval, the stock of cattle in France has been reduced about 2,000,000 head, the price of butchers' meat has been greatly increased, and the consumption of beef in Paris has declined from about 31 kilogrammes to 25 kilogrammes per individual. In consequence, loud and well-grounded complaints have been made by the town and manufacturing population of the operation of the duty, and the probability is, that it will, at no very distant period, be effectually reduced. But it is material to observe that, despite this oppressive duty, the value of the live animals imported into France in 1839, principally from England, Wurtemberg, Bavaria, and Baden, amounted to £674,775. Under these circumstances, the idea of France supplying us with any considerable quantity of cattle is out of the question. Indeed, anyone acquainted with the state of France, with the smallness of the farms, and the all but total deficiency of green crops, must treat with contempt the notion of her exporting beef or cattle. Spain, since the repeal of the prohibition, has supplied us with a few cattle, and sanguine expectations have been entertained of her capabilities in this respect. We, doubt, however, whether these are destined to be realised. The pastures of Spain are no doubt of vast extent, but it is generally believed that they are more suitable for sheep than cattle; and the voyage across the Bay of Biscay will always be a considerable obstacle to the cheap and easy importation of the latter.

"Eastern Europe, including Hungary and the southern parts of European Russia, has a vast extent of fine pasture land and some very fine breeds of cattle, with which, but for the distance, we might be abundantly supplied. Unluckily, however, the expense of their conveyance would be so very great as to preclude the

possibility of their being imported; and it is even doubtful whether we shall ever be able to derive from these countries any considerable supply of salted provisions.

"It appears, from the customs' returns, that from the repeal of the prohibition against the importation of foreign cattle, on the 9th July, 1842, down to the 5th of January, 1843, only 4,277 head of cattle (including calves) were imported, and only 648 sheep and lambs. (Parl. Paper, No. 45, Sess. 1843.) And it is well known that this inconsiderable importation was unprofitable rather than otherwise, and that there has hardly been a single animal imported during the three months ending with June, 1843. At the same time, however, it must be admitted that it is by no means improbable that agriculturists in the contiguous countries should apply themselves to the breeding of stock for the English markets; and that their importation should, in consequence, be considerably increased.

"But, supposing (of which we regret there is little or rather no probability) that in some half-dozen years we should be able annually to import 30,000 or 35,000 head of foreign cattle, and that eventually this number should be increased to 100,000 or 150,000 head, still, it is easy to see it could entail no real injury on the agriculturists of this country.

"We have already seen that, at present (1843), the average annual slaughter of cattle in London amounts to about 175,000 head, and the average annual slaughter in Great Britain is certainly not under 1,350,000 head. Hence, it appears, that even on the extravagant supposition that 100,000 head of cattle were imported, it would not amount to one-thirteenth part of our supply, and could not, therefore, have any material influence over prices. The influence of an importation of 30,000 head would, it is obvious, be all but insensible.

"In saying that an importation even of 100,000 head of cattle, which most certainly is four or five times greater than the importation will amount to for a good many years to come, would not materially affect prices, we do not reason theoretically, but on the solid foundation of experience and analogy. In 1826, for example, we imported about 57,000 head of cattle from Ireland into Great Britain; but, in consequence of the increased facilities given to importation by the introduction and extension of steam navigation, Ireland now supplies us with about 180,000 head of cattle, or between three and four times as many as we imported from her 17 years ago.

"But, instead of the price of cattle in Great Britain falling in consequence of this immense increase of importation, everybody knows that it has very decidedly increased. And, when such is the fact, is it not childish to suppose that the value of stock is to be seriously depressed, and the breeders and graziers ruined, by the admission of cattle from abroad under a duty of 20s. each?"

M'Culloch's statements and opinions, viewed by the light of our experience since 1843, lead us to the conclusion that the importation of cattle into Great Britain was never contemplated as likely to attain to such proportions as to keep down the price of beef; and it is satisfactory to find that, in increasing the number imported, we have attained a point of improvement in quality as well, which closely approaches the excellence of our own productions.

In the report of the Committee on Trade in Animals, evidence from the West-end butchers was produced, to the effect that foreign cattle and meat were never bought by them. Not only in this respect, but in many others, I am disposed to look with much suspicion on the conclusions of Parliamentary inquiries, when there are, on the one hand, for the inquirers, honourable members with possibly foregone conclusions, and on the other, men who, naturally enough, do not care to publish to the world the "secrets of the trade." When the chairman of the Trade in Animals asks a West-end butcher whether he ever buys foreign produce to stock his shop, it is expecting too much from human nature to get a reply in the affirmative, when, by so answering, the witness knows fully as well as the inquirer can tell him, that, assuming he supplied them all, he would lose the custom of every gentleman in the committee-room; although, if talking the matter over with a confidential friend, the same witness could not deny the fact that he buys not only Jutland and French beef, but also Dutch mutton.

On this point I would refer you to the evidence of a gentleman who is a salesman in Newgate-market, who gave his evidence before the Committee on Trade in Animals, with a conciseness which must have convinced his hearers that he was at home with the subject, and whose testimony in any inquiry on the question, I consider not only invaluable, but essential to arriving at a correct estimate of the position of the trade. Being asked the following question, "Do you find the foreign meat trade in different hands to the English meat trade?" he replied, "It very much depends on the class of persons and the state of the trade at the time. As to the inferior kinds of foreign meat it is generally sold to butchers who carry on business in the poorer parts of London, or to contractors, *but we have some consignments of foreign meat that are bought by the West-end butchers.*" It would, therefore, appear that, at least, some foreign meat is found sufficiently good to satisfy the requirements of a portion of the West-end community, amongst whom it is popularly believed that pecuniary considerations give way to matters of taste and luxury, at all events, in the main, more so than is the case with that section of the metropolitan community east of Temple-bar.

The limits of a paper such as is now before you will not admit of so full a consideration of the subject as I should wish to enter into, and I must content myself with the foregoing proof of the increasing improvement in the quality of the cattle imported, a fact which is well known to every one directly connected with the import trade, and which is gradually being admitted by all who approach the subject. To those who are satisfied of this improvement being correctly stated, it would be superfluous to urge the importance of our having, as far as practicable, unrestricted importation of cattle alive; and where opinions of an adverse character prevail I can only hope for better convictions, and I will, for the purposes of this paper, assume that the importation of cattle from abroad is an absolute necessity, and, leaving the broad question of such necessity, will at once proceed to consider the details of the system adopted in conducting the trade in foreign cattle.

As we have already seen, after the removal of the prohibition and the almost equally restrictive duty on cattle, no material importation was received in this country till 1846, the numbers standing as follows:—

	Neat Stock.	Sheep and Lambs.	Pigs.
1843	1,521 ..	216 ..	361
1844	4,889 ..	2,817 ..	265
1845	16,833 ..	15,957 ..	1,590
1846	45,043 ..	94,624 ..	3,856
1847	75,717 ..	142,720 ..	1,242
1848	62,738 ..	130,681 ..	2,119
1849	53,449 ..	129,266 ..	no return.
1850	66,462 ..	143,498 ..	no return.

after which there was no material increase till 1860, when the numbers were as follows:—

	Neat Stock.	Sheep and Lambs.
1860	104,569	320,219
1861	107,096	312,923
1862	97,887	209,472
1863	150,898	430,788
1864	231,733	490,243
1865	283,171	914,170

I am not prepared with returns showing what portions of the above were sold in London; but it may be roughly taken that of all the importations into Great Britain,

more than half the total number are sent to the Metropolitan Cattle Market; and the following figures will give a general idea of the quantities sold in the market alluded to:—

In 1842 there were 191,207 head of neat stock and 1,373,683 sheep exposed for sale in the Metropolitan Cattle Market, and after the expiration of 15 years, say in 1857, there were 261,477 head of neat stock, 1,330,630 sheep, 23,078 pigs, the proportion of British to foreign being then very much greater than it has since become, the relative quantities being:—

Date.	Beasts.		Sheep.	
	English.	Foreign.	English.	Foreign.
1857	208,278	44,758	1,194,975	135,655
1862	249,051	51,466	1,213,800	288,370
1863	229,392	80,238	1,152,225	338,405
1864	220,294	119,174	1,199,075	353,100
1865	177,435	144,281	967,325	657,080

Date.	Calves.		Pigs.	
	English.	Foreign.	English.	Foreign.
1857	8,976	19,565	22,833	245
1862	6,898	20,230	28,780	690
1863	6,259	26,795	23,500	3,530
1864	6,175	29,422	27,202	5,110
1865	4,327	32,131	25,738	5,255

A rate of increase in favour of the foreign which is most marked.

In speaking of the importation of foreign cattle into Great Britain, I must explain that actual importation, in the general acceptance of the word, is the exception, the cattle being almost always consigned on foreign account to be sold by the salesmen in the market at the best possible price; the few actual importers being shipowners having vessels trading to Spain and Portugal, who bring over an occasional part cargo, more with a view of augmenting their freight than dealing in cattle as a source of profit; and I am credibly informed that the operation of importing cattle in such manner as I allude to has never left any satisfactory result, inasmuch as the foreign breeder or dealer, especially in the two countries I have mentioned, has always the advantage of markets almost as good as our own.

Cattle from continental countries, which I will shortly mention, come almost exclusively on account of dealers abroad, who consign them to the various salesmen in the Metropolitan Cattle Market, the shipments being arranged so as mostly to arrive in London in time for the Monday's market, some few arriving for the Thursday's market, but the major portion for the former. The market is open in summer about four, and in winter about seven o'clock, and, with a brisk trade, it is no unusual occurrence for one salesman to have disposed of 400 to 600 oxen by 10 o'clock in the morning, when he at once proceeds to make up his account sales, to be sent away the same evening along with Bank of England post bills covering the value of each sender's consignment. The dealings in live cattle are almost without exception conducted verbally, and it is a feature, creditable not only to the seller but the buyer, that disputes or repudiations are almost unknown; the number of salesmen to whom the bulk of the cattle are consigned being about 12 or 14, who have their drovers in attendance at the various landing-places when boats are expected, to receive such cattle and sheep as may be forwarded to their respective consignees, and convey them to the market or lairs in the neighbourhood to await their being sold.

The principal ports whence we derive our importations are as follows:—

Port of shipment.	District where cattle are fed.	Average duration of voyage.
Harlingen	North Holland	24 to 30 hours
Rotterdam.....	South ,, ...	18 to 24 hours
Antwerp	Belgium and German districts, from the Hungarian frontier	12 to 18 hours
Bremerhaven ..	Oldenburg and part of the German districts ...	48 hours
Hamburg	Berlin, Magdeburg, &c.	48 hours
Tonning	Schleswig-Holstein	48 hours

From all of which, in their respective seasons, we obtain a steady and reliable supply, in addition to occasional shipments from—

Port of shipment.	District where cattle are fed.	Average duration of voyage.
Oporto	Portugal	5 days
Corunna	North of Spain	3 to 4 days
Various French ports, from Boulogne down to Caen	North of France	12 to 36 hours
Aarhuus.....	Jutland	3 to 4 days
Gothenburg	South of Sweden	3 days*
Revel and St. Petersburg	Esthonia	5 to 6 days

Which, however, are not reliable, especially from the last-named, owing to the unprofitable nature of the trade.

From the ports named the cattle are, as a rule, brought in paddle steamers (paddles being considered preferable to the screw for cattle) which have mostly been built for the express purpose, and fitted with every contrivance calculated to give the animals the best possible chance of going through the discomforts of transit with as little suffering as possible, so much so that I believe whatever pressure of a legislative character is brought to bear on this particular traffic, it will be found that nothing of a compulsory nature can be suggested which would not—if it has not been anticipated—be voluntarily adopted by all steam-ship owners connected with the trade, inasmuch as they are, above all people, most interested in bringing the cattle, not only alive, but in as good a condition as they possibly can; for, not only is their freight dependent upon the cattle being delivered alive, but they have an object in obtaining and retaining for their vessels a good name as cattle carriers, it being beyond question that shippers give a decided preference to vessels which are known to be "good boats." Assuming, then, that an individual or company devotes a certain amount of capital in providing cattle-boats for any particular service, it follows naturally that unless the latest improvements are adopted, the chances are some more forward competitor will not only take away all the honour but all the freight; and consequently competition does, not only for the comfort of the animal but the pocket of the dealer, all and more than any mere government interference could bring about.

Moreover, in the matter of the comfort and safety of the animals as carried in the paddle-steamers now engaged in the service, I am quite certain, from my intimate knowledge of the sea traffic in cattle, that, as a rule, the ox fares better than inexperienced lookers on are in the habit of believing. In stormy weather great discomfort must necessarily exist, but for this there can be no remedy for either man or beast. On shipment, cattle are carefully walked into the holds of the vessels in which they are to be conveyed, the holds being divided into stalls or pens by means of strong boards and stanchions, each stall carrying from three to ten bullocks, according to arrangement, the plan adopted being to stow the cattle and pen them off so closely as to prevent them from lying down, this being found in practice to be not only the most comfortable way for the cattle, but the surest manner of bringing them safely to their destination.

* The twin-screw *Mary*, owned by Messrs. Dudgeon, the eminent shipbuilders, performs the passage under 48 hours.

In the regular cattle-boats (and, as far as the importation of London is concerned, the rule is to have boats specially fitted), attendants are provided whose sole duty is to look after the cattle, to feed them, to give them water, and, in the event of any bullock being off his legs, or what is technically called "down," to get him up again on all fours, so that he may not be trodden upon by his fellow-bullocks. Every regard is paid to proper ventilation of the vessels, so much so, indeed, that on a recent inspection of some of the regular cattle-boats to London by Dr. Thudichum it was found that the ventilation was so perfect that he could suggest no improvement. On arrival at the destined landing-place on the river the vessel is put alongside the wharf without any delay, and the discharge of the cargo proceeded with as expeditiously as possible, which usually occupies one to two hours, according to the state of the tide, the vessels regularly constructed for such service generally, when fully laden, bringing from 400 to 600 oxen and 1,000 sheep at one time.

The whole of the animals walk out of the holds by means of inclined planes, and are at once claimed according to their brands by the respective consignees, who take charge of them, water them, and lot them, until each man obtains the quantity for which he holds bills of lading. The scene which occurs on the landing of a cargo of cattle is something so bewildering to the unpractised eye, that I can easily appreciate the feeling conveyed of utter confusion and awful cruelty, especially if (as occasionally happens) there are one or two casualties amongst the cargo; but, considering all the circumstances, the operation of landing can scarcely, if at all, be much improved. On landing, or as soon after as circumstances will allow, every animal is examined by the veterinary inspectors appointed by the Commissioners of Customs, of whom there are two for London, who are members of the Royal Veterinary College, and perhaps more experienced than any other two men in the world for the functions with which they are charged, having yearly under their inspection more foreign cattle than any one else in the kingdom.

It has been sometimes alleged that the veterinary inspection, on landing, is not sufficiently strict; but if this assertion is tested by the logic of facts, it will be found utterly untenable, and in the opinion of those who are competent to discuss the question, and who are actually conversant with the inspection in force, any error will be granted to be in too harsh, rather than too lax a system in this respect. Nothing is allowed to leave the landing wharf until the medical inspector has given his permission, after which the process of delivery goes on, and the clearance of a large cargo completed. The cattle are, if upon the Saturday, driven to the respective lairs of the consignees, or to the Cattle Market, as occasion requires, and after sale are driven to the premises of the slaughtering butcher, or to the abattoirs at the Cattle Market. At one time about one-third of the cattle exposed for sale in the Metropolitan Cattle Market were bought for sending into the country, but, owing to the recent Orders in Council, this privilege has been withdrawn, and I am told the consequence is enhanced prices in many districts, where butchers are now compelled to come to London to buy in the dead meat market. The question of compulsory slaughter at public abattoirs having been so completely shelved by the report of the Committee on Trade in Animals, calls for no remark.

Assuming, then, that the importation of cattle from abroad is essential to our great meat-consuming community, I submit that the arrangements at present in force are quite equal to the necessities of the occasion, and although much might be said on the plea of humanity, much more must be considered on the grounds of necessity.

Without the supplies which we derive from continental Europe, we should unquestionably have to pay for meat in England, and notably so in London, a much higher price than we are paying, even in these days of obnoxiously high prices, and hence it becomes a question of grave consideration how far the existing regulations bearing upon the importation of foreign cattle should be interfered with. On this subject, in the spring of 1866, a select committee was appointed to inquire into the trade in foreign animals, and although in the opinion of many gentlemen connected with the import trade, several members of the said committee entered on their functions apparently with a decided feeling against the present system, it is a noteworthy fact that the report of the committee, with minor recommendations, pronounced the trade in animals to be conducted in such a manner that there was absolutely nothing whatever to improve. In the inquiry in question, after carefully going over the evidence given to the committee, one point has occurred to me as being entirely avoided, and it is all the more remarkable from the fact that it is, without exception, the most disreputable feature of the trade in animals, whether by rail or steamer,—I allude to the cruelties of the drovers who take charge of the cattle on arrival in London. Why the men employed for such duties in London are so much more cruel than the similar class employed in foreign countries, I am at a loss to understand, but that there is a most marked difference in favour of the foreigner is an accepted fact, and I regret the circumstance, not only as a question of humanity, but because I believe that the irregularities of the casual drover, or "outsider," have done more than any other circumstance to bring the cattle traffic in London into disrepute.

In the course of my usual vocation, which brings me into personal contact with most or nearly all the drovers who frequent the river-side, for the purpose of receiving the cattle brought into London by way of the Thames, I have been struck by the anomaly, considering the wages they have to pay, of the master-drovers—a respectable and careful class of men, all charged with the responsibility of delivering valuable consignments to their employers, the salesmen in the market—being utterly unable to obtain such assistance in their business as will enable them to prevent the gross cruelties which are observable on the occasion of cattle being either landed, or driven, or exposed for sale in the market; indeed it is no uncommon occurrence that the cattle when in the market are less tenderly used than occasion requires, and this in the immediate presence of the salesman, who is powerless to check such brutality.

As a rule each master drover has leading men to take charge of each drove of cattle, and he usually trusts this charge to those who have shown themselves trustworthy to a certain extent, but his duties require his superintendence at various points, and he cannot follow every particular lot of cattle he may have to attend to, consequently he must, in a great measure, rely on his foremen. I would not for one moment have it understood that the under drovers are themselves guilty of all the enormities laid to their charge, but I am satisfied that the extra hands, men who are known as "outsiders," called in on special occasions, are not to be trusted. And so long as cattle are allowed to be maltreated as they have been, a stigma must attach to the whole class to which I refer. I have myself on many occasions interfered at the wharves when I have observed any cruelty being practised, and it has occurred that, when I have turned from the offender, he has made the poor brute suffer all the more for my interference, a circumstance, if unsupported by other evidence, in itself sufficiently disgraceful, but I have the testimony of some of the leading master drovers in London of a corroborative character. In conversing with them I have asked what remedy they themselves would suggest, but they seem at a loss to recommend any course, and can only reply that they would be glad to find men who would do their work more carefully and more free from the unnecessary brutalities they are reluctantly obliged to pass over as though unseen. I have learnt with

something akin to horror, that in the lower grades of drover society the great point ambitious spirits strive to attain is the superior dexterity with which the stick can be so applied as to produce the keenest suffering to a passing bullock, and if the operation is neatly performed, and the poor animal bellows out its agony and rushes frantically off, the operator is looked upon as thoroughly qualified and as an adept in his profession.

Such a scene is not imaginary, as every one connected with the cattle trade can vouch, but it was only a few weeks ago that I learnt from a reliable source that the practice of cruelty has been elevated to a science. I am quite conscious of the difficulties of managing cattle, especially in large droves, and that coercion of some kind is absolutely necessary, as otherwise it would be impossible to get the work done; but the malpractices at present are not only a scandal, but cause actual destruction of property, the value to the butchers of the animals being very often reduced in consequence of the bruising sustained by the superfluous thwacking they get. The remedy is one of so simple a character that Sir Richard Mayne could at once materially reduce the evil, were the police-force instructed to keep a close watch on the men who are to blame, and to press for heavy punishment at the hands of the magistrate in whose district the offender should be detected. In the case of foreign cattle driven to the Metropolitan Cattle Market from the various landing-places on the river, the only routes which are permitted by the Police Commissioners being clearly defined, as authorised for that purpose, and at each landing-wharf the roads, streets, &c., to be taken being set forth on a large board, a little vigilance on each line of driving would be quite sufficient to deter even the most accomplished wielder of the goad, after a few cases had been detected and heavily punished by the magistrates, followed by the withdrawal of the regular license which all drovers are required to have. This, supplemented by placards in the metropolitan market, and lairs at the landing-wharves, would, I feel satisfied, have a most deterrent effect, and lead to much alleviation of the suffering inflicted by the drovers.

I leave it to students of the philosophy of the human mind to account for the phenomenon of a man taking pleasure in torturing a poor, dumb animal, and will merely remark that I have invariably found the most culpable men to be the most ignorant, and, so far as education goes, not a jot better than the brutes they torture, a circumstance naturally leading to the inference that an improvement in the treatment of the cattle can only be expected as a consequence of the mental and moral improvement of the class to which I allude.

The subject of driving cattle through the streets of London is undoubtedly one of very great importance, especially when bearing in mind the already overcrowded state of the great thoroughfares of the Metropolis, and I am quite prepared to find myself at issue with the advocates of the principle of "taking the butcher to the ox, instead of the ox to the butcher," for I believe myself that the practice could never be carried out. This, of course, at the moment, is a question of opinion, and it would be more than rash to assert that any adaptation of trade to circumstances is impossible, after the experience of the past 20 years, but I doubt very much whether the system of supplying London and the other towns of the kingdom with home-fed supplies could be carried out, and I have a strong opinion as to the absolute impossibility of doing so with foreign cattle, either killed at the port of shipment or place of landing; but even admitting such possibility, it is a canon of faith amongst those more competent than myself to form an opinion, that it would be only then at a great inconvenience, a great pecuniary loss to the seller, and, consequently, increased prices to the buyers, and the certainty of, in the warm summer months, either having no meat in the market, or meat not sound enough for ordinary consumption. I shall, of course, be met with the instance of the recent importation on a large scale from the Dutch ports of dead meat, consequent on the prohibition of the importation of live cattle, owing to the continuance of the rinderpest, which, however, is merely confirmatory of my previous assertion, for the extra cost of freight and other charges, along with the loss in value of offal, &c., increases the price of the sheep in the London dead-meat market 7s. to 9s. per head, besides which, the risk of sound delivery is not computed.

It must also further be noted, that Holland is not the only country from which we obtain our supplies, but the voyage being of shorter duration than any other cattle voyage, renders the experiment of shipping dead meat one attended with less risk than from other districts. Just in the same manner we have had large importations of dead meat from Hamburg in the cold weather, when it will keep for an almost unlimited time; but this is a question of weather and distance, and it would not be safe to rely on the supplies subject to such contingencies. In summer time the importation of carcases, even from Holland, I apprehend would not be attempted, unless in exceptionally cold summers.

On this point, the Committee on Trade in Animals attempted to elicit from the various gentlemen who were examined evidence in favour of the proposed system of bringing the whole of the supplies into large towns slaughtered, and so avoiding the traffic in live cattle, but the object failed, and I cannot find any opinion on the subject worth following in favour of the scheme. On the contrary, I find that those who from their position are qualified to speak positively on the question, say that we cannot do without a live cattle-market; and, in effect, the Committee in their report substantiate this, for on the subject of foreign trade they report as follows:—

1. The importation of foreign cattle is very important, for, as the home supply of cattle is reduced, the importation tends to keep down the price of meat, and it appears impossible to supply dead meat from foreign ports to any but a very small extent.

2. Compulsory slaughter at a port, like compulsory slaughter at a market, is more expensive to the butcher, hampers the trade, and will diminish the importation, and raise the price to the consumer.

3. The compulsory slaughter of all foreign cattle at the port of discharge, under the recent Orders in Council, has prevented the importation of any store cattle or sheep (which was an increasing trade), much to the detriment of the Scotch farmers, who have been unable to stock their lands, and has diminished the importation of fat cattle, a trade which would otherwise have increased.

4. Although to some extent one class of butchers purchase foreign, and another class English fat cattle, yet there are many who purchase both. The separation of the markets would exclude these men from one or the other market.

5. Such a separation of the two markets seems therefore undesirable. The evil of the cattle driving in the streets might be much diminished if they were landed lower down the river than at present, and brought up by rail, whilst this course would also bring the cattle in better condition, and allow of better accommodation at the wharves.

The last recommendation necessarily leads to the consideration of how far cattle can be landed at a spot convenient to London, so as to supply the metropolitan market with live cattle without the annoyance of driving through the streets, a system which would relieve us to a great extent of the evils complained of. I must confess, however, that this subject I would prefer leaving to others to discuss, inasmuch as I am personally interested in the promotion of the scheme for landing down the river and conveyance by rail to the market, *viâ* the landing place at Thames Haven. I may, however, say that my being connected with this measure arose, not from pecuniary motives, but from the conviction of the advisability of cattle being landed be-

low Blackwall and conveyed direct by rail to the Metropolitan Cattle Market, so that I may, perhaps, submit my opinion as to the benefits of Thames Haven without being subjected to the charge of prejudice or interest, especially when it is borne in mind that other places for landing cattle below Blackwall or Woolwich—such as the new Dagenham Docks—will doubtless be constructed, to all of which some of the advantages of Thames Haven will apply. This latter place has been alluded to as being actually in working order, and it has the special advantage of being so situated that vessels arriving there with cattle are relieved of the worst part of the river navigation.

Thames Haven is an out-of-the-way place, consisting of some dozen small cottages, situated about 9 miles below Tilbury, on the Essex side of the river Thames, about 14 miles above the Nore, and in direct communication with London by the Tilbury and Southend line, and may be known to some present as being a passenger route much used in the summer season between London, Margate, and Ramsgate. Attention having been drawn to it in 1856–57, as a desirable landing-place for cattle, when a few cargoes were landed there from Bremen as an experiment, it was found that the anticipations of the railway lessees in whose hands it then was vested were well founded, and, had not the loss of the boat which was the pioneer of the system put an end for the moment to the operation, there is no doubt the trade would have been gradually developed. Subsequently, however, a new Bremen company started a line of several steamers to London, and, whether from action taken by the railway lessees or from the conviction that the Thames Haven route presented greater facilities I am unable to say, but they determined to adopt the new route to the Metropolitan Cattle Market, and it was found to answer remarkably well. In the meantime, the attention of the trade was directed to the practicability of relieving the over-crowded streets of London of the cattle traffic, and at the same time getting the cattle into the market both in better condition and in less time than by coming up to the landing wharves at Blackwall. About twelve months ago some gentlemen interested in the trade as cattle-salesmen and cattle steamboat owners, determined to secure the lease of the premises, with a view to extending the accommodation for landing and forwarding cattle to the Copenhagen Fields Cattle Market, which has been done, and their operations are now in full force, such cargoes as they can influence being landed there and sent at once to London to the cattle station of the London and North-Western Railway, in Maiden-lane, Camden-town, whence they have to be driven only 500 yards into the lairs of the cattle market. The advantages of landing cattle at places down the river consist of an avoidance of a three or four hours' passage up the river, where the navigation is subject to greater impediments the higher the vessel has to proceed; and in autumn especially, when fogs prevail, it is almost invariably the fact that the majority of vessels, when detained from that cause, have to bring up a little below Gravesend; indeed I have known it to be frequently the case that vessels having passed Thames Haven have encountered fog below Gravesend, and been compelled to come to anchor for some hours, during which time the cattle of course suffer very considerably from excessive heat. The advantages are equally manifest to the ship owner, inasmuch as he saves eight hours' fuel per voyage, as well as other minor expenses, and avoids the risk of navigation in a crowded river, a fact of considerable importance, inasmuch as the majority of collision cases in the Thames occur this side of Gravesend. It would therefore appear that the benefits of landing places down the river, in direct communication with the London Cattle-market, are worthy of consideration, and the experience to be gained during the ensuing year will be the best criterion.

If, therefore, the great annoyance of cattle-driving through the streets can be avoided by landing some distance down the river, having direct railway communication with the market, I consider that, so far as London is concerned, a great improvement will be effected, not only in the matter of traffic, but in the pecuniary benefits which will be derived both by the cattle-dealer and the shipowner, with a consequent benefit to the consumer; the only drawback being the interference with existing private rights, for it would certainly be considered a harsh measure to render compulsory any regulations which would deprive the present cattle-wharves of the revenues which their owners are warranted in representing as clearly due to them.

Public convenience, however, is the great desideratum, and it becomes a question for consideration to what extent holders of the property in question shall be compensated out of the national exchequer in those cases where such owners can show that they suffer actual prejudice by reason of the withdrawal of the privilege of landing cattle at their wharves.

By this means relief would at once be obtained from driving through the streets to the market, and the maintenance of a live cattle-market be secured, which is, I contend, a proved necessity for London; and, whichever point of debarkation may ultimately be decided upon, the two points just named should be steadily borne in mind. The traffic in cattle has increased during the past 20 years to an enormous extent, the actual importations in 1865 being 17 times as much as in 1845, and there is every reason to expect this increase to be maintained, but not if restrictions and impediments are placed in the way of importers.

The necessity of encouraging by every possible facility the attendance in our markets of the foreign dealer, will possibly be more appreciated when we consider the actual number of cattle in proportion to the population in the various countries of Europe whence we draw our chief supplies, the statement of which will go far to induce belief in my assertion that there is nothing in the condition of the stocks abroad to make it worth the foreigner's while incurring extraordinary risk, or working against vexatious restrictions.

According to the latest statistics, the number of cattle in each country named to every head of population stood as follows:—

Belgium	about		$3\frac{5}{8}$
United Kingdom	„		$3\frac{1}{3}$
Prussia	„		$3\frac{1}{3}$
Russia	„		3
France	„		$2\frac{5}{8}$
Austria	„		$2\frac{1}{3}$
Oldenburg, Schleswig	(each)	„	1
Denmark, Bavaria	„	„	$\frac{3}{4}$
Sweden and Holstein	„	„	$\frac{1}{3}$
Spain	„		$\frac{1}{6}$

From which we may conclude that, assuming my figures to be correct, if every one of the countries consumed to the extent that we do in England, there would be no margin for exportation as far as numbers go; and it is somewhat remarkable that in Belgium and England, both better stocked than any of the other countries, the prevailing cry of high prices charged for meat is most unmistakeable.

In the figures to which I have drawn your attention there is, I think, good grounds for concluding that we are not likely to increase our importations to any material extent unless we encourage the trade, which encouragement will consist in a maintenance of the existing system of live markets; and, with much deference to the opinion of those who hold a contrary doctrine, I would submit that there has been no case hitherto made out for an interference with the present system of foreign cattle traffic; and unless some plan is introduced bearing marks of an improvement without the drawback of discouraging senders from supplying us with

their stocks, I cannot approve of any re-arrangement of the traffic, which would only disturb without improving our present system.

I should have drawn your attention to the subject of the relative prices and qualities of foreign and home-grown meat, the inconvenience of slaughtering at the port, or rather point of debarkation, as well as the continued prohibition of the importation from Holland, many of the districts being perfectly free from rinderpest. I find, however, that I have already occupied your attention too long, and I shall deem myself fortunate if I have succeeded in convincing any one present of the importance of leaving undisturbed, in its principal features, the existing mode of conducting the trade in foreign cattle.

DISCUSSION.

Mr. S. Sidney said his avocations brought him continually into contact with graziers, wholesale butchers, farmers, and country gentlemen, and he was at a loss to know where the author of the paper had derived the idea that there was any considerable class of persons, exercising the slightest political influence, who desired at the present day to limit the importation of foreign cattle into this country. Mr. Irwin might have met with a farmer smarting under recent losses from the rinderpest, who might, possibly, have said something about the loss he would sustain if an unrestricted foreign cattle trade was permitted, but as far as his (Mr. Sidney's) own experience went, all classes agreed in the importance of taking every means to secure as large a supply as possible of healthy meat. He laid stress on "healthy" meat, because infection was just as much to be feared amongst cattle as amongst human beings; but he could not support the view which Mr. Irwin had enunciated, rather than stated fully, that rinderpest was not an imported disease, and therefore that it was not necessary to have restrictions upon the foreign cattle trade. There were three or four facts in connection with this disease which were somewhat striking, even to persons not possessed of technical knowledge on the subject. It was in June, 1865, they first heard of the disease existing in this country, and since then it was well known how large a proportion of cattle had perished. When it first appeared in France, by the adoption of severe restrictive measures it was checked at once. In Ireland prompt measures had been taken to prevent the transmission of cattle from England to that island, and the result was that, with a trifling exception, Ireland had been free from the disease. In this country we allowed it to rage uninterruptedly for some time. The government hesitated to adopt stringent steps, and the disease spread; but from the moment they did adopt really stringent measures it was gradually lessened. It was to be remarked that the disease among cattle was by no means a new thing on the Continent. In Hungary and some parts of Germany the disease was as well known to veterinary surgeons as small pox, and both the army and the police were employed to prevent the introduction or spread of the disease; the moment any outbreak took place on a farm, the premises where it occurred were isolated, and the cattle were even fed from the top of the building so as to avoid all contact with them. Many persons were of opinion that the disease had been communicated from place to place by those who were employed as inspectors. The great point, however, to be considered was, what system ought we to adopt in future for regulating our foreign cattle trade. It appeared to him that we ought to give every facility for the importation of cattle from countries which had a clean bill of health, and that the most stringent regulations should be enforced with respect to countries that were not in that condition. Holland was one of the countries where the disease was treated mildly; the consequence was, while we had succeeded in stamping it out, the rinderpest still raged in Holland. With respect to the quality of the cattle imported into this country, it was pretty well known that, as a rule, they were equal to the second-class meat, but seldom equal to the first-class meat produced in this country. The best qualities of meat were supposed to go to the west-end of London, and it was probable that, as a rule, the butchers of that locality had very little to do with foreign meat. At the time Mr. M'Culloch wrote on this subject a great proportion of the foreign animals imported had been employed in various kinds of labour till they were old; they were then fattened and sent to the English market, and produced a very useful and, no doubt, very wholesome meat, but it was not of a high quality. In addition to these team cattle, in France and many parts of Germany good breeds of bulls had been imported from this country, and by two or three crosses with native cattle they had produced a good beef-producing animal, though not equal in quality to our own stock, and a very large trade was now done in that description of cattle. Very excellent cattle were sent from Portugal and Spain. These were fine animals, of an enlarged Highland type, but they were worked till they were five or six years old—some even to ten or twelve years—then fed on Indian corn and sent to this country fat. It had been said of these that they were very beautiful beasts, and when cut up their flesh was veined like marble, and was nearly as hard. He might add that when Mr. M'Culloch wrote he could have had no idea of the immense change that had been effected in the foreign meat trade by the network of railways on the continent, and consequently his remarks could not be correctly applied to the cattle trade in the present day. He (Mr. Sidney) knew one gentleman connected with the metropolitan market who was in a position to receive from Vienna 500 beasts per week; these were drawn from Hungary and Galicia, and only good feeding was required to make them most valuable animals. He agreed with the author of the paper on the question of the importation of dead meat, that where there was not a market for the offal, the beasts could not be slaughtered without considerable loss. But here, again, they must look ahead. He believed the best way of disposing of an animal was that when purchased it should be taken to a well-regulated slaughter-house, and there slain, and all parts of the meat distributed. Nothing would be a more severe tax for the meat-eaters of the metropolis than that they should be compelled to concentrate the work of slaughtering in one or two places, and in the hot weather of summer be obliged to distribute the meat from those spots alone. There was, however, an important difference between requiring that suspected cattle should be slaughtered at the port of debarkation, and placing restrictions upon healthy cattle. Those interested in the foreign cattle trade would damage it if they looked for too much. Let them ask what was rational, and look to those who would have to buy meat in ten years' time as well as to those who bought it now. They might be able to supply the people with cheap meat to-day, but some years hence it might become a dearer article than it was at present, if proper and reasonable restrictions were not adopted.

Mr. Bishop thought the rinderpest had been communicated in a way not generally suspected. It appeared to him that cats and dogs had often conveyed this disease about amongst the stock of the country. Indeed, he had himself seen a cat which was pronounced to be suffering from the rinderpest. When he was in Moldavia, in 1864, the disease had broken out there, and a Hungarian dealer in cattle told him he suspected his dog had conveyed the disease to some of his cattle, a great many of which were lost by the rinderpest. He thought this was worth noting, because the cow-sheds of London had suffered very severely.

Mr. Bailey Denton suggested that the discussion should not turn on the cattle plague, but on the question treated in the paper, viz., our trade in foreign

cattle. He thought an important element had been omitted—that was the question of the establishment of abattoirs. He would not state any opinion of his own as to their desirability, nor was he going to endorse the opinion of Mr. Sidney, that the wholesale killing of animals at the port of arrival was the wrong thing to do; but he suggested to those who entered into the discussion to consider whether the extension of abattoirs would not have the effect of preventing a great deal of cruelty in the treatment of the animals, besides other advantages. He could not quite endorse the views of Mr. Irwin with regard to the freedom from cruelty which prevailed in the transit of cattle across the Channel. Notwithstanding the excellence of the arrangements in many respects, he had himself witnessed the greatest cruelties in the sea passage.

Dr. Crispe expressed his astonishment that in the present day any one should be found to support the doctrine of the spontaneous origin of the cattle plague; moreover, he felt certain that, during the incubation of the disease, it was impossible for any inspector to detect it so as to be able to select from a herd of cattle those which were positively free from infection. His own impression was that until all foreign cattle underwent quarantine at the ports where they landed, or were slaughtered at those ports, we should never be free from the disease. But the rinderpest itself was a matter of even less importance than other diseases. During the last 30 years there had been two other distinct forms of disease among cattle, viz., the foot and mouth disease, which, though it seldom killed, deteriorated the condition of the animals very much; and pleuro-pneumonia, which was more destructive than the cattle plague. There was no question in his own mind but that the disease was imported into this country by foreign cattle. He had been in the neighbourhood of Harwich, where he had seen a great many sheep affected with small-pox, which had been communicated by foreign sheep landed there, and in the early stage of that disease it was impossible for a veterinary surgeon to detect it in the animal. He thought there could scarcely be a person present who believed that the foreign trade in cattle could be stopped entirely. It must increase, but the countries mentioned in the paper were but little to be depended upon for our supplies, which, he thought, ought to come in the form of dead meat from Canada, South America, and Australia. He believed large ships would be fitted-up for that particular trade, with all the necessary arrangements for bringing flesh food to this country in a good state. His own opinion was, that in twenty years there would be a great change made in the whole meat supply of this kingdom. It had been said, with reference to the cattle-plague, that they could not enforce the restrictions made, but he (Dr. Crispe) had stated to the Privy Council, in the early outbreak of the disease, that unless they stopped all movement of cattle, killing the infected animals, and compensating the owners, the disease would never be got rid of. This plan, though not adopted at the time, was ultimately found to be the only efficient one, and the result was that the pestilence, if not wholly removed, was now very nearly stamped out. With reference to what had fallen from Mr. Bishop, he gave it as his opinion that no animal except a ruminant could take the disease, and that opinion was based on a great many experiments. He had inoculated both dogs and cats with the rinderpest; he had himself eaten the diseased meat, but without any effect, and he felt sure that the views of Mr. Bishop on this subject were erroneous.

Mr. Harry Chester remarked that Mr. Irwin had brought before them many and strong arguments in favour of one particular side of a great question which had a great many sides. He (Mr. Chester) could not but find fault with the paper as being one-sided, in advocating only one method of supplying a great portion of the animal food required for the people of this country. He thought the author might have given a little more credit to attempts which had recently been made to supply our markets with dead meat, and not appear to maintain that the only supply should be that of live cattle, to be brought into London by the Thames Haven Railway, which seemed to be the upshot of his recommendations. For his part, he thought the great wants of the population could never be supplied by live cattle alone. He apprehended very few would be found to propose that the supply of live cattle should be put an end to; but why they should not supplement it by a supply of dead meat, he could not comprehend. It was a matter for gratification to find that the cattle were so well cared for in respect of accommodation and treatment on the passage across the water; and it was not till they were disembarked that they were subjected to unnecessary cruelty at the hands of the drovers. He, however, remained of opinion that the arrangements for the transit of cattle were still capable of improvement. How delightful it would be if, when we had occasion to cross the Channel, we were packed so closely as not to be able to lie down, and had at the same time the advantage of knowing that if we did fall we should immediately be picked up by a humane drover, to prevent our being trampled upon by our companions. With reference to dead meat, he believed there had already been very considerable importations of it, and he had not heard of its being considered unfit for food. It might not be exactly of the quality delivered by the West-end butchers, but it had gone far to supply a great want; and if it had been introduced successfully during the summer months of the year, we might expect it to be imported on a much larger scale in colder weather. He hoped the meeting would not go away with the idea that the quantity of animal food depended on what was sent us from Holland, inasmuch as great supplies might be looked for from South America, Australia, and other countries; he would particularly mention Spain; anyone who had seen the numerous herds there of most magnificent cattle would be of opinion that large districts of that country were well fitted to supply us with beef. The Council of the Society, as many present were aware, had appointed a committee on the subject of the supply of food, and he had no doubt their investigations would throw valuable light upon the subject.

Mr. Rudkin, having thanked Mr. Irwin for his able paper, remarked that he believed the observations with respect to the very objectionable practice of driving cattle through the streets of London would be endorsed by every person who understood the matter. He believed more cruelty was exercised by the over-driving of cattle than by the use of the goad by the drovers. Animals that arrived at Blackwall late on market mornings were driven through the streets at speeds which were most unjustifiable; and between the Cattle Market and the Liverpool-road he had seen ten or twelve beasts "down" from overdriving. He believed a large proportion of the London drovers set their faces against cruelty as much as the community at large did. He considered the system that had existed for many years past of carrying on the trade in cattle in the metropolis was one that had worked well up to a certain period; but now that London had increased to such an extent, the traffic of the streets was so great that the question was how to relieve it in any way; and public convenience demanded that the driving of cattle through the streets should cease. There was no reason why animals should be landed at Blackwall and driven thence through the streets to the market, as they might be taken direct by railway to Copenhagen-fields. With regard to public abattoirs, he was a strong advocate for them, although it was hardly to be expected that the retail butchers would at once accept the view that it was possible for them to carry on their business without slaughter-houses in contiguity to their premises; but he believed, in reference to the carcass butchers, there was no reason why the meat furnished by them should not have been slaughtered at central abattoirs. It was the custom to purchase live

animals in the market, whence they were sent to Whitechapel and other parts to be slaughtered, from which the carcases were conveyed in carts to Newgate and Leadenhall, and there sold wholesale. His argument was that the animals might just as well be slaughtered in the neighbourhood where they were purchased, which would involve only one removal instead of two; one of them being the driving of the cattle through the streets. This, he was aware, would affect large existing interests, but he would not deprive any one of existing rights without due compensation. With regard to the view that it was necessary to protect the English producer from the introduction of disease, he endorsed the opinion that restrictions for this purpose were desirable, but he thought as much evil was often to be dreaded from the presence of diseased English cattle as from those imported from abroad. The cattle brought from the Continent were landed here, and taken to the market, and were not permitted to leave the metropolis alive. Now, since the 9th of November last, not a single case of rinderpest had been reported to the Markets Committee (of which he was chairman) in cattle coming from abroad. If they wanted protection against any class of animals in the markets, it was against those from the cow sheds and other places—bought by jobbing men to get a small profit out of them. He believed it would be to the interest of the large salesmen in the metropolitan market to establish at their own cost a thorough system of examination of every animal, because they should bear in mind the fact that, by an Act of Parliament or an Order in Council, if an animal suffering from rinderpest was found in the market it might lead to the total closing of it for a time, and the interests both of the producer and salesman would thereby be damaged. The practical conclusions at which he had arrived on this subject were—that the time would arrive when the driving of cattle through the streets would not be necessary, and that abattoirs should be established in suitable central positions, and that the slaughter-house and cow-house system should be abolished. With reference to the drovers, the Corporation of London had under its charge the licensing of those men, and the selecting of them was a difficult task. A system had been laid down, under which it was required that men applying for licenses should have the signatures of two respectable householders; but, as might be expected, all sorts of frauds were practised. This system, however, had lately been modified, and, he hoped, with good results. If, however, the cattle were brought direct from the water side to the market by railway, and if abattoirs were placed near the market, the necessity for drovers would in a great measure cease, except within the immediate vicinity of the Metropolitan Cattle Market, and here they would be under the supervision of masters and their foremen.

Mr. Woodley, as one largely connected with the carcass trade, wished to state that, as far as his own experience went, the reported cases of alleged cruelty on the part of the drovers were greatly exaggerated, and he believed a person might remain in the market all day and not see a single act of cruelty. With reference to the driving of cattle through the streets, he would remark that the route provided was generally through streets in which the traffic was not very great. The manufacturers of meat, as he might style the carcass butchers, were not limited to the Metropolitan Market for their supply. He bought cattle in the country largely, and the bulk of them never saw the Metropolitan Cattle Market, but were taken direct to his premises and slaughtered as they were required, and the carcases sold. The whole of the East-end of London was supplied by an extensive row of shops, in which great quantities of meat were sold daily. It would, therefore, be depriving them and himself of their businesses if the slaughtering were taken to public abattoirs, as had been recommended. In the case of the great bulk of the meat only one removal took place, which was effected by the retail butchers. With regard to the condition in which imported dead meat arrived, he could say even at the present season the loss was very considerable, and the prices as well as the supply fluctuated very greatly. If the animals were brought alive the prices could be better regulated, and it was desirable that in so valuable an article as meat the loss should be as small as possible from deterioration. On the subject of the conveyance of cattle to the market by railway, Mr. Woodley complained of the great delays that were often occasioned by that system. With respect to the Thames Haven line, unless there were adequate means of conveying the animals direct to the particular spots where they were required, he did not see that any advantage would be gained by their being sent by that route.

Mr. Price begged to put in a plea on behalf of the Wapping side of the question. He had been connected with the carcass trade for a great many years in that densely-populated district, and he would say that the cruel treatment of the cattle by the drovers was greatly exaggerated; as in all other classes of the community, there were some bad members, but they were as a body a painstaking, hard-working, and hard-living class of men. On the subject of the "blocks" in the streets, occasioned by driving cattle through them, he thought that the great obstructions were for the most part caused by the railway vans, and, inasmuch as the cattle were obliged to be taken by a prescribed route, he thought it no more than justice that the railway vans should be placed under a similar regulation. They might be said to be the great nuisances of the streets. With regard to the opinion expressed that the cattle disease had not a spontaneous origin, he would state that he had had a good deal to do with endeavouring to ascertain the source of the epidemic—if imported at all. Many veterinary surgeons and people connected with the trade were of opinion that it was not imported. A case in point came under his own observation. Within a few miles of London the cattle plague struck down two cows of a herd. It had been generally supposed that persons attending upon diseased animals were liable to carry the infection to healthy animals and thus spread the disease; but, in the case he alluded to, the infected cows, which were removed to a distance from the others, were attended to by the same men who attended the remainder of the herd only two or three fields off, yet they did not take the disease.

Mr. Bonser said, with reference to dead meat imported from abroad, it was alleged that it sometimes came in very bad condition; but it must be borne in mind that this was a new trade, without proper organization at present. It was only last summer that the first consignment of dead meat came from Holland, and a large portion of it was slaughtered by men unaccustomed to the work; the consequence was the meat arrived here in a worse condition than it would have been if the slaughtering had been properly done. Large quantities of dead meat were received from Scotland every day, in excellent condition, though the time occupied in the transmission was longer than from Holland, being in the one case 40 hours on an average, and in the other 30 hours. He believed when this trade had been longer established the arrangements would be such as to enable meat to be received from Holland in as good condition as that which came from Scotland. He considered it undesirable to have unnecessary restrictions upon the live cattle trade. As soon as it could be done safely, let the trade be thrown open, and let the exporter send the article dead or alive, as might be found most convenient.

Mr. Campin said a plan had been invented by Prof. Redwood of preserving meat in paraffin, and bringing it fresh from great distances, such as South America, and concessions were now being sought for from the South American Governments, which would enable the people of this country to be supplied with essentially fresh meat from long distances abroad, and at moderate prices.

Mr. Webber remarked that the tendency of the discussion had been to throw them back upon old ideas. Mr. Rudkin had told them that the live cattle market had been very properly taken outside the town, while the great dead meat markets were to be retained in the central part of it, which he thought very objectionable. Wapping might be a good position for a foreign dead meat market. Formerly the great centre of the potatoe market was in Tooley-street, now it was at King's-cross. The City authorities might build markets as they liked, but every trade would locate itself in the places best suited for its purposes, and he believed the time would come when there would not be a single market of any kind in the city. If there was one objectionable trade which should be cast from the centre of a city it was the selling of cattle, and the system of abattoirs at various points of the metropolis would not only tend to the advantage of the trade, but to that of the City itself.

The Chairman remarked that they had heard the question discussed from all points of view, except his own, the farmer's point of view. This was a very important discussion, but he thought it was to be regretted that it had confined itself too much to the details of trade, rather than taking up the broad question in which all were interested, how best to supply this great country with meat from abroad. As a farmer, he might say that they wanted no sort of protection whatever. They did not dread competition, but they did dread foreign diseases, and against them they asked this country, and societies like this, to do all they could to protect them. He not only asked that on the part of the farmers, but also on the part of every consumer of meat in the kingdom; for he was sure if there was a re-introduction of the cattle-plague, and a recurrence of the sad devastation they had witnessed during the last eighteen months, it would not only be a most serious loss to the public, but cause almost entire ruin to the agricultural interest. He was sure they would not desire to separate without passing a cordial vote of thanks to Mr. Irwin for his most comprehensive and valuable paper.

The vote having been passed,

Mr. Irwin thanked the meeting for the way in which they had received his paper; he considered the views he had laid before them had not been in any way controverted during the discussion.

Proceedings of Institutions.

Yorkshire Union of Mechanics' Institutes.—*Hunslet Mechanics' Institution.*—The annual *soirée* was held recently in the lecture hall. After the tables had been removed the annual meeting was held, at which the Mayor of Leeds presided. Mr. Child, the secretary, read the report, which stated that the present number of members was 285, showing a decrease as compared with the previous year of 39. During the last month, however, 73 persons had become members of the Institution, which was mainly accounted for by the fact that the evening classes, lectures, and entertainments commenced at that period. The Institution was, unfortunately, in debt in the sum of £400, but the committee hoped that as they had been enabled in the last few years to pay off a large amount of it, it would shortly be entirely free from incumbrance. The day school and the evening classes in connection with the Institution were in very satisfactory operation and well attended, the number of students being 152 in the former, and 132 in the latter department. Much of the success of these classes was due to the fact that a very efficient and able teacher had been secured. Many of the pupils had received prizes and certificates at the examinations conducted by the West Riding Educational Board. The library contained 2,800 volumes, and the reading-room was well supplied with current literature.—The Mayor, in the course of his address, remarked that the advantages Mechanics' Institutions held out to the artisans for the acquirement of scientific and general knowledge were very great, and ought to be much better appreciated, considering the fact that there never was so much necessity for their making themselves acquainted with such subjects, as they had to compete not only with the mechanics of this, but also of other countries. Of late years many articles in the manufacture of which England was thought to be superior to all the world, had been imported into this country, so that it behoved the mechanics to devote themselves more earnestly to the acquirement of such knowledge as would be useful to them in their daily avocations. It was only by their obtaining such information that the superiority of England in manufactures could be maintained.—Mr. T. B. Baines moved the adoption of the report, and expressed his opinion that although the number of the members enrolled in the Institution had fallen off, it was more than counterbalanced by the fact that the evening classes were much better attended than formerly, because, as he regarded it, the efficiency of such Institutions was to be estimated not by the number of their members, but by the proportion who received a solid education in the classes. He believed the reason of many manufactured articles having been imported into this country, as alluded to by the Mayor, was because the education of the working classes had been so much neglected.—Mr. Henry H. Sales seconded the adoption of the report, and urged upon the members that diligence, industry, and perseverance were the only means by which knowledge could be obtained, for to its acquisition there was no royal road, and all, whether rich or poor, as regarded mental qualifications, stood upon the same platform.—The Mayor then distributed the prizes and certificates awarded to the various pupils.—Mr. Councillor Shepherd moved, and Mr. Councillor Mellor seconded, a vote of thanks to those gentlemen who had furnished the funds to provide the prizes that had just been given, and especially to the president (Mr. Alderman Blackburn). Votes of thanks to those who had contributed to the funds of the Institution, to the committee, the ladies, and the Mayor, concluded the proceedings, which were agreeably diversified by the performance of a glee party. *Eccleshill Mechanics' Institution.*—The annual *soirée* was held under the presidency of Wm. Milnes, Esq. The report recorded a steady increase of members. The classes had been so largely attended that three additional rooms had been added to the Institute. In every subject, with the exception of advanced geography, good progress had been made. Prizes had been awarded by the committee in addition to a higher and lower grade prize, carried off by two students in the last elementary examinations of the West Riding Educational Board. The Institution prizes were presented by the chairman to the successful candidates, and the certificates and prizes of the West Riding Educational Board by Mr. Henry H. Sales. Addresses were given by Mr. W. Byles, of Bradford, and other gentlemen. An excellent selection of music was sung by the choir.

PARIS EXHIBITION OF 1867.

The following memorandum has been issued for the information of exhibitors of machinery:—

1. The pressure of steam in the boilers will be 60 lb. per square inch, and somewhat less in the Exhibition building, according to position. Water can be had under a pressure due to a few feet head above the floor level from a main within a moderate distance from each exhibitor's space.

2. Water under a pressure due to a head of 98 ft. can be had on demand, by laying a pipe from the main which adjoins one side of the British space. Steam will

be exhausted into pipes, which will be within moderate reach of each exhibitor.*

3. Waste water will be run into a conduit, also within easy reach of each allotment. The original ground under the machinery gallery is not reached for some 7 or 8 feet from the floor level; the made ground, is, however, well consolidated.

4. Exhibitors must bear in mind that it rests with them to make due provision for everything in the way of water, steam, and exhaust pipes, foundations, counter-shaftings, &c., that their machines may require.

5. Exhibitors can make their own arrangements for driving pullies, but in case it should suit their conveience to find pulleys ready for them on arrival, a list of prices is sent herewith, at which drums can be supplied and fixed on the main shaft.

6. Exhibitors wishing to avail themselves of this arrangement can do so by direct agreement with Messrs. Bryan, Donkin and Co., Grange-road, Bermondsey, who are the makers of the shafting.

7. When the drums are on the shaft they can be keyed up by the exhibitors, to suit as to position their requirements. All pulleys put up after the shafting is in its place must be in two halves. No pulley not made in halves can be removed from the shafting without being broken off.

8. The largest pulley that can be used is 3 ft. 6 in. in diameter.

9. The diameter of the driving shaft opposite the space of is inches.

10. All cotton waste, wipings, &c., must be kept in a metal box.

11. To ensure the public safety exhibitors will be required to fence off machinery in motion in such a way as the Commissioners may deem necessary.

12. After the 1st of March the various lines of shafting will be run at intervals to afford such exhibitors as may require it an opportunity of trying their machinery.

13. The whole of the machinery must be completely installed by the 15th of March, on which date a general trial will take place.

14. Exhibitors are requested to bear in mind the difficulties of transport which are likely to ensue from the blocking of the railways, and to take the earliest opportunities of despatching their goods. They are reminded that without the co-operation of the exhibitors the British Executive are powerless to uphold the national character for punctuality, which they earnestly hope will not suffer in the hands of any of those concerned in the Paris Exhibition of 1867.—By order, R. G. Wylde, Secretary to the Executive Commission.

London Offices, South Kensington Museum.
Paris Offices, 71, Avenue des Champs Elysées, Paris.

RECRUITING AND EDUCATION.

The following letter appeared in the *Times* of the 28th ult.:—

Sir,—While education is making great changes in the habits of the whole people, which exercise an influence on recruiting for the army, the military authorities who discuss the subject show an imperfect sense of their importance. Education indisposes young men to be entrapped by the recruiting sergeant, as they were accustomed to be before Parliament voted its first £30,000 for national education 30 years ago. And popular education is likely to increase with increase of wages, making recruiting on the old-fashioned system in vogue during the war—the worst period, perhaps, of modern British history—more and more impossible. Whether or not military men like the notion, the soldier of the future will become a more educated and intelligent animal; and they must therefore admit these changes, and be prepared to deal with them.

There is no reason to deplore the growth of education, even as respects fighting purposes. The present remarkable position of Prussia shows what educated soldiers can do. These Prussians are soldiers who can all read and write and pray, and have shown that they can fight as well as Englishmen, while the majority of our soldiers do not possess any one of these three qualifications to the same extent.

If properly dealt with my own belief is that education may actually be made auxiliary to reorganising our army on a proper basis, consistently with the changes of the times.

There is no gainsaying the views you expressed in the *Times* of the 22nd of November, and again to-day, about the connexion between the Militia and the standing army, and that the militiaman must have more affinity with the regular soldier, and be qualified to enter the Line at a moment's call, and to effect this we must go beyond the sergeant and the pothouse.

In my opinion, if England is to maintain her position and her dependencies, especially in India, we must begin our training of soldiers at the National Schools. I say, make drilling a part of the work of every school aided by public funds. My experience in my own parish convinces me that there would be no difficulty in doing so. My "yokels" would read and write, and sing in church, and follow the plough, all the better for some drilling. And there is nothing children like better than physical action. Drilling twice a week would be very popular, and impede no other studies, but really help them. Let the State make an allowance upon every child who annually shows good results in drilling, as it is doing now for morals, reading, writing, and ciphering. In our retired soldier pensioners the nation has drillmasters already made and at hand.

When the youths leave school, continue a bounty on drilling, and it will be the fault of the Government if there be not an ample supply of militiamen and future soldiers. But they must be induced to become soldiers by self-interest, animated by a feeling of patriotism, which may be encouraged. Give up altogether the entrapping by tippling in pothouses; rather reject the scamps than try to catch them. Treat the soldier as a skilled labourer, as he is, and treat him well, but as strictly as you please. The Government must compete with the labour and emigration market, and beat it in price. I see no insuperable difficulties in making all the grown men of the country militiamen if the drilling and their ordinary occupations be properly adjusted. The organization must obviously be local, as the Marquis of Salisbury and others have pointed out, and it need not be over costly. I am no financier, but if we could get wisdom and reponsibility to undertake army management, I believe the present expenditure of millions might be made to go much further.—I am, &c.,

A Country Clergyman.

Nov. 26.

* A plan will be issued showing the general arrangements of the lines of shafting and steam pipes with reference to the exhibiting space.

Fine Arts.

Lowestoft Porcelain.—The most complete collection of this extinct manufacture yet seen has for some weeks been on view in the South Kensington Museum. The many hundred specimens which illustrate the divers styles of pottery and porcelain made at Lowestoft have been brought together by Mr. Chaffers, from private collections, a task all the more difficult from the want of any distinguishing mark on the ware. The manufactory was established more than one hundred years ago, in consequence of the discovery at Lowestoft, a town on the Suffolk coast, of choice clay, and it became extinct early this century, partly because it could no longer compete with the Staffordshire potteries, which had command of coal on the spot. At the time of its greatest prosperity Lowestoft employed seventy workmen, and the wares found a market in London and throughout the country,

as well as in Holland and Turkey. The five cases at Kensington display, as to material of manufacture, specimens of earthenware, and of hard and soft paste porcelain, the hard being a rare speciality; and as to art, they exemplify the comparatively rude manner of Delft, the design and colour of the East, with points of approximation to French and German styles. It has been sometimes conjectured that these wares were as to body made in the East, and brought to Lowestoft merely to be painted. But Mr. Chaffers, in his volume on "Marks and Monograms," has rebutted the assumption. This collection, however, shows that Lowestoft porcelain, like most other European manufactures, was, in art and manufacture, as close a copy of Oriental as it was possible for infant Western factories to make. Some of these specimens are also allied to Dresden ceramic wares, and others to French, the latter approximation being sufficiently explained by the employment of a French refugee as decorator; other styles or motives again are expressly English, testified by the inscription "Wilkes and Liberty." The combination of subjects indeed is as violent as of styles, thus we find a group of mandarins associated with "Elizabeth Buckle." There are also to be observed very varied degrees of technical excellence, not only in the handling, but in the colours; the enamels especially have a gem-like transparency and lustre. Generally speaking the best works are those which approach most nearly to Oriental originals, but the translation of Eastern into English modes is often anomalous and uncouth. Yet some few of these imitations have rare merit for design; for lightness, as in the egg-shell fabric; for modelling of patterns in relief, and even distribution of conventionalised surface decoration. The whole collection is eminently instructive. Lowestoft ware has been little known. Not a single specimen was seen in "the loan collection" of 1862. Henceforth, however, the historian will be able to add an important chapter in the annals of the ceramic arts in England, hitherto all but a blank.

Manufactures.

Proposed Agricultural Prize in France.—The Agricultural Society of Compiègne has opened a subscription, amongst its members and supporters, for the establishment of a great prize of 100,000frs. (4,000) to be awarded in the year 1868 to the inventor of the most efficacious system of mechanical cultivation. The want of labourers in agriculture is severely felt in France, and there seems to be a fear that the scarcity is more likely to be increased than otherwise, and the Society of Compiègne expresses the hope that mechanical science, which has already done so much for agriculture, will find the means of applying to small parcels of land the same, or similar, economical methods which have been introduced with so much success on the large scale. It is to be feared that the problem thus stated is impossible of solution, one of the essential elements of success—extent of area—being wanting; but the offer of the Society does not relate exclusively to small properties, but to methods of cultivation generally, and there is no doubt that the prize which is to be offered will act as a healthy stimulant to inventors.

Commerce.

Agricultural Produce in Turkey.—The harvest of cereals is finished at Adrianople. It leaves nothing to be desired as regards quantity and quality. It is calculated that the province of Adrianople, that produces generally barely sufficient for its own consumption, this year will be able to export upwards of 200,000 hectolitres of wheat and rye, and 100,000 hectolitres of barley. As to the provinces of the Philippopolis and Slimnia, the abundance there is such that they may easily export upwards of one million hectolitres of corn. This state of affairs would have been most favourable if the scarcity of water in the Maritza, occasioned by four months of dry weather, had not rendered the navigation impossible. The province of Slimnia, more favourably situated, sends its produce to the port of Bourgas, on the Black Sea, and has effected numerous sales at the prices of from 23 to 24 piastres per killow of Constantinople (8·77 killows = 1 quarter) for hard wheat, and 22 to 23 piastres per killow for soft wheat, 10 piastres for rye, and 9 piastres for oats, free of expense on board ship. The production of cocoons in the province of Adrianople amounts to 132,000 okes (39·53 okes = 1 cwt.), of which two-thirds have been shipped for Marseilles, and the remaining third is reserved for the supply of the European silk factories in the country. The province of Philippopolis has produced 32,000 okes of cocoons of mediocre quality, which have been wound on the spot. The sale of the tithes of the agricultural products of the Vilayet of Adrianople, that comprises the five provinces, of Adrianople, Philippopolis, Slimnia, Rodosto, and Gallipoli, produced a revenue of 43,000,000 of Turkish piastres to the Imperial Treasury.

Peruvian Silver Mines.—Silver and gold are extracted in various places in Peru; but the only mines of importance are the silver mines of Pasco. Silver sometimes is found in native state, but most often in sulphides of silver, in argentiferous pyrites, carbonates and sulphates of copper. The processes made use of at Pasco are primitive; the wet ore is crushed by means of machinery put in motion by water power. From thence it is placed on the circo, basins of masonry within low walls. It is mixed with 10 to 11 per cent. of sea salt and turned with a shovel, and horses or mules are driven round upon it for several hours; quicksilver is then added and afterwards lime. This mixture is allowed to rest for two or three months, then it is put into bags, and an amalgam of silver and mercury is obtained free from any foreign matter. The amalgam is enclosed in large earthen jars, at the mouth of which a gun barrel or iron tube is fixed, that leads to a vessel full of water for condensing the quicksilver. It is then heated, the mercury evaporates, and the silver remains. A great loss is caused by this rough process; 75 per cent. of the mercury employed disappears. The slowness of this process, the loss that it causes, the scarcity of labour, all these have greatly diminished the working of the Pasco mines, and Peru scarcely yields annually gold and silver to the value of six million piastres.

Olive Oil in the Island of Sardinia.—According to the official statement, the cultivation of the olive tree occupies an area of 7,600 hectares, about 19,000 acres, in the northern part of the island, where it is carried on on a large scale. The oil of this country is much esteemed in commerce; it is of fine colour, limpid, and aromatic, when the gathering and the crushing have been done quickly in the proper seasons. Unfortunately, these two most important operations for producing oil both good in quality and quantity, are rendered fruitless by the scarcity of manual labour. The olives, after being gathered from the tree, are allowed to remain undisturbed for more than a month on the ground. By this means they are dried, and lose a part of their volume. They are then passed through a mill, and undergo a fresh loss caused by the fermentation of the fruit. The process of crushing is very primitive. The mills are turned by horses, and the paste is made by hand. With a better process the produce might be increased 25 per cent. The average cost of cultivation, pruning, gathering, and crushing of the olives, is about 42 frs. per hectolitre, or 420 frs. per hectare, taking the annual produce per hectare at 10 hectolitres of oil. The average price of oil on the spot for the last five years has been 100 frs. per hectolitre, to which 5 frs. must be added for carriage to Porto Torres, and 1 fr. per 100 kilogrammes for export duty, should the supply

be sent to France. The oils of *ressence* are worth from 60 to 65 frs. per hectolitre. Nearly all the edible oil of Sardinia is exported to Genoa. The inferior qualities are mixed with the oils named oils of *la riviera;* and the *ressences* are principally sent to Marseilles. The freights for Genoa and Marseilles are about the same; usually 3·50 frs. per hectolitre by steamboat, and 1·50 frs. by sailing vessel. Of the four to five million hectolitres of oil of *ressence* produced by the island of Sardinia, about half is exported to France.

Colonies.

The Intercolonial Exhibition.—The Sydney Government has appointed the Commissioners for the Paris Exhibition to act as Commissioners for the Intercolonial Exhibition, and has placed a sum of money at their disposal for the purposes of the latter undertaking. The whole of the Australian colonies will therefore now be represented at the Exhibition; and there is every prospect that the display will be worthy of their extent and resources. The building in which the Exhibition is to be held is rapidly approaching completion. Its internal accommodation is spacious, and will afford abundant room for the advantageous display of the various articles. Upwards of 20,000 feet of space have been applied for, without taking into account what will be required for the local Exhibitions at Beechworth, Ballarat, Castlemaine, Sandhurst, and Sale, and irrespective of the accommodation that will be taken up by the neighbouring colonies. The number of exhibitors from Victoria alone will be about 400, and it is calculated that altogether the catalogue will contain a list of 1,000 exhibits.

Protection in Victoria.—An agitation for protection has been carried on with activity in this colony, and several meetings have been held, the most important of which was at Ballarat, where the following resolution was passed:—"That it is desirable to form a District Farmers' League in Ballarat, to secure an extension of the present tariff, so as to impose a duty on imported grain, and encourage the cultivation of the soil of the colony, and thereby promote labour, and retain in the country the large amount of capital which is annually sent to foreign countries for cereals which can be produced at home if fostered and encouraged." Other resolutions were passed at other meetings, the most notable of which was that such a corn-tax should be imposed as would prevent foreign wheat from being sold in the colony under 7s. per bushel, that being a maximum rate in the markets, and far above the average price.

Exports of South Australia.—The total exports from the colony of South Australia, for the year 1861, were £3,129,846, against £3,305,699 for the year 1864, showing a decrease of £175,699. The total exports sent during 1865 were distributed as follows:—

Great Britain	£964,900
New South Wales	557,680
Victoria	124,464
Tasmania	10,645
West Australia	28,500
East Indies and China	77,200
Mauritius	3,525
Other British Possessions	242,220

The value of breadstuffs exported during the year was £1,228,480; and of the minerals, £620,000.

Publications Issued.

Elements of Chemistry, Theoretical and Practical. By W. A. Miller, M.D., LL.D., Professor of Chemistry, King's College, London. (*Longmans.*) Part III. Organic Chemistry.—This is the concluding volume of the third edition of Professor Miller's Chemistry. The most important changes in the present edition consist in the adoption of the new form of notation, and in a recurrence to the system of nomenclature introduced by Berzelius. "This nomenclature," says Dr. Miller in his preface, "has been occasionally used ever since it was proposed, but it was not extensively adopted by chemical writers in this country until its merits were prominently insisted upon, two or three years ago, by Professor Williamson." "The system," he adds, "possesses advantages in brevity and precision which will, there can be little doubt, lead to its gradual substitution for the older nomenclature." "The change in notation," he continues, "will doubtless be attended with more inconvenience; though it is certain to be adopted, since in none of the recent investigations made in this country, and very few of those made on the continent, is the old method made use of."

Notes.

The Scientific Congress of France.—The meeting of this association, which was to have taken place during the summer at Amiens, but was prevented by the visitation of the cholera, is appointed to be held at Aix, in Provence, on the 12th of December. Many important communications relative to questions in physical science, geology, botany, medicine, archæology, literature, the fine arts, agriculture, and philosophy, are promised by savants and amateurs of the South of France. A second meeting is announced to be held at Nice during the four last days of the same month.

Correspondence.

Mosaics.—Sir,—There appears to be much difference of opinion on the subject of this art, which is simply that of copying a good picture by means of different coloured tesseræ, instead of colours laid on with the brush. The matter of which the tesseræ may be composed is of little importance, excepting for the position in which the picture is to be viewed, the only rules being that the whole of those used for one picture shall be of the same texture and uniform colour respectively throughout their substance, so that after finishing, the whole may be ground down to a perfect level surface of fine grain, but not polished, except in the case of the Roman miniature mosaics. A variety of materials have been used, but there are three only of any importance:—First, various coloured marbles, expensive, and ill adapted to form brilliant pictures. Second, baked clay, terra cotta, or china, provided it is dead, and not enamelled. Lastly, smalt, enamel, or amorphous glass. The last is the only material used for the Roman miniature mosaics, for which purpose the smalt or amorphous glass of every shade and colour is drawn out to great fineness, sometimes less than a common bristle, in order that the divisions where the cement appears may be almost invisible. The smalt threads are notched with a file, and broken off as wanted. The Roman artists will grind down and repolish the surface of their beautiful lava snuff-boxes for such purchasers as may have some doubt that the beautiful picture before them may not be the result of some variety of enamel painting. The size of the tesseræ depends upon the distance from which the picture is to be viewed. Those in the dome of St. Peter's at Rome are more than half an inch square, and yet they form perfect pictures. In any case the surface must be ground down level after the tesseræ are fixed and the cement set, or they cannot be considered true mosaics.—I am, &c., Henry W. Reveley.

Limited Liability.—Sir,—The time for discussion on the above paper having nearly expired, my remarks were somewhat rapidly delivered, which has, I presume, led to the reporter giving an inaccurate account of them. I wholly disagreed with limited liability, both in principle and practice, and what I really stated was, that if limited liability had fulfilled, even in a small degree, the anticipations of its promoters, it would have been one of the greatest successes of the age; that the two principal arguments in its favour had broken down, viz., the security of the uncalled capital, which was now being reduced in nearly all concerns, and the small amount each shareholder would have to pay, rendered inoperative through the number of individual shares being unlimited. I trusted to individual energy in private firms to improve arts, manufactures, and commerce, rather than to irresponsible secretaries, interested managers, indifferent directors, and pliable accountants, concluding with the remark that, in my opinion, it was a disputed point whether the want of honesty was most apparent in the conception or realisation of the scheme. Having always persistently opposed limited liability, I am sure late events have not been calculated to induce me to alter my opinion.—I am, &c., James Figgins, Jun.

London, Nov. 30.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...R. Geographical, 8½. 1. Colonel C. W. Tremenheere, "On the Physical Geography of the Lower Indus." 2. Capt. H. H. Godwin-Austen, "On the Pangong Lake in Tibet."
Medical, 8.

Tues. ...Medical and Chirurgical, 8½.
Civil Engineers, 8. Mr. W. H. Preece, "On the best means of communicating between Passengers, Guards, and Drivers of Trains in Motion."
Photographic, 8.

Wed ...Society of Arts, 8. Mr. J. G. Crace, "On Old London, its Streets and Thoroughfares."
Graphic, 8.
Microscopical, 8. Mr. H. Davis, "On two new species of Tube bearing Rotifers."
Literary Fund, 3.
Archæological Assoc., 8½.

Thur ...Royal, 8½.
Antiquaries, 8½.
Zoological, 8½.
Syro-Egyptian, 7½. Mr. W. F. Ainsworth, "On the Vale of Achor or of Trouble."
Numismatic, 7.
R. Society Club, 6.

Fri .....Astronomical, 8.

Patents.

From Commissioners of Patents' Journal, November 30th.

Grants of Provisional Protection.

Anchors—2859—W. Bayliss.
Boots and shoes—3008—J. Vero.
Braces—3020—I. Evans.
Carbonate of soda—3030—A. P. Price.
Carriage brakes—2879—W. H. Clapp.
Cement—2168—W. Welch.
Cereals, conserving—3014—A. E. Blavier.
Chemical decorations—3002—W. Grune.
Cut crops, drying—3036—W. A. Gibbs.
Curtain rods—2877—W. E. Newton.
Doors, closing—2893—J. Deavin, J. H. Sutton, and M. Deavin.
Electric telegraphs—3038—J. L. Clark.
Explosive powder—2779—J. Sharp and R. Smith.
Eyelet machines—3004—E. Drucker.
Fabrics, producing figured—2865—T. D. Clapham.
Fibrous materials, cleaning—3070—R. E. Lazonby.
Fibrous materials, doubling—2806—A. V. Newton.
Fire-arms, breech-loading—2875—W. J. Matthews.
Fire-arms, breech-loading—2996—E. C. Hodges.
Fire-arms, breech-loading—3022—T. W. Webley.
Fluids, regulating the flow of—3048—J. Robertson.
Friction breaks—2881—R. D. Napier.
Governors—3052—E. H. Knight.
Grain, preserving—3062—J. Barker.
Heavy bodies, raising—3046—R. A. Hardcastle.
Illumination—2873—N. F. Taylor.
India-rubber, cutting—3012—J. M. Dunlop and F. Crossley.
Inkstands—2906—G. Davies.
Irons—3072—C. E. Brooman.
Lathes—3034—T. Greenwood.
Locomotive engines—2986—T. Page.
Manure—2988—J. C. Morrell.
Measurements, ascertaining correct—3018—D. Kirkaldy.
Metal, coating—3060—E. Morewood.
Mills, &c., illuminating—2871—J. R. Wigham.
Motion, transmitting—2867—R. A. Hardcastle.
Organs—2793—E Alexandre.
Pump valves—2883—C. J. Robinson.
Railway breaks—2984—J. Clark.
Railway distance signals—3068—R. Holiday.
Railway wheels and tyres—3024—J. H. A. Gruson.
Safety cabs—3028—T. Earp and R. Ashton.
Ships' furniture—2009—C. Ritchie.
Shop fittings—3074—G. F. and J. Stiddolph, and J. R. Morley.
Smoky chimnies, preventing—2889—W. E. Gedge.
Spikes and rivets—3053—A. V. Newton.
Spinning machinery—3010—C. E. Brooman.
Steam boilers—2848—F. A. Calvert.
Steam boilers—3056—W. Clark.
Steam boilers, furnaces for—2887—W. Humphrey.
Steam engines 2994—J. Erskine.
Steam engines—3016—J. Bolvin.
Tan, drying—3042—C. D. Abel.
Textile fabrics, finishing—3040—W. Chambers.
Tickets, marking—3060—J. Kemble.
Tungsten with cast iron, combining—3066—P. R. M. le Guen.
Vehicles, wheels for—3026—E. W. Morton.
Vessels, ascertaining the position of foundered—3044—A. Hunter.
Vessels, propelling—2998—E. Humphrys.
Vessels, propelling—3032—C. H. Simpson.
Volute springs—3054—G. Haseltine.

Inventions with Complete Specifications Filed.

Rocks, drilling—3065—G. Haseltine.
Fabrics, looms for—3098—G. Haseltine.
Sewing machines—3059—G. Haseltine.

Patents Sealed.

1298. D. Chadwick, jun., and G. A. C. Bremme.	546. M. C. Rogers.
1514. H. W. Pire and J. White.	1548. A. Moncrieff.
1515. E. T. Bellhouse and W. J. Dorning.	1558. J. Hopwood.
1516. E. T. Bellhouse and W. J. Dorning.	1559. W. Laurence.
1520. T. J. Smith.	1562. J. Loader.
1524. G. R. Mather.	1567. H. Greaves.
1530. J. Yule.	1572. J. J. Friedmann.
1533. H. and J. Crawford.	1583. J. Moss.
1536. C. T. Julius.	1618. W. Bellhouse.
1450. J. Knight.	1692. W. E. Newton.
1452. J. Lecoq.	2016. T. Wilson.
1544. C. Henderson.	2247. W. E. Newton.
	2451. W. E. Newton.
	2456. A. V. Newton.
	2561. W. E. Newton.

From Commissioners of Patents' Journal, December 4th.

Patents Sealed.

1553. J.M.Tankard&J.Cockcroft.	1629. J. G. Marshall.
1555. C. A. McEvoy.	1651. A. Miroude.
1560. W. Lawrence.	1722. W. E. Gedge.
1564. A. Parkes.	1742. F. Kahnt and J. Bunting.
1578. W. E. Newton.	1804. A. V. Newton.
1581. C. H. Murray.	1874. N. Salamon.
1586. H. A. Dufrené.	2270. G. White.
1627. W. R. Hammersley.	2678. W. Harvey.

Patents on which the Stamp Duty of £50 has been Paid.

2985. J. Clark.	3031. J. Harper.
2989. P. Gaskell.	3034. T. Harrison.
3006. H. Wilde.	3037. R. A. Brooman.
3005. E. M. Boxer.	3062. J. H. Johnson.
3015. W. Clark.	3181. A. V. Newton.
3054. R. Hornsby, jun., and J. E. Phillips.	3036. C. Lungley.
3251. G. T. Bousfield.	3043. E. Stevens.
	3105. J. Wright.

Patents on which the Stamp Duty of £100 has been paid.

2694. R. A. Brooman.	2727. W. Betts.
2706. B. Samuelson and W. Manwaring.	2798. W. Betts.
2713. G. J. Firman.	2809. J. Chatterton & W. Smith.

Registered Designs.

Gardener's Powder Canister—November 16—4825—F. A. P. Pigou, Dartford, Kent.
Shaft Tug Loop of Harness—November 18—4826—J. McNought, Edinburgh.
Revolving Octagon Show Stand—December 4—4827—H. Develin, jun., 12, Castle-street, Hastings.

Journal of the Society of Arts.

FRIDAY, DECEMBER 14, 1866.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'clock:—

December 19.—"On the Study of Indian Architecture." By James Fergusson, Esq., F.R.S. On this evening Sir James Fergusson, Bart., M.P., will preside.

Cantor Lectures.

The first course of Cantor Lectures for the present session will be "On Pottery and Porcelain," and will be delivered by William Chaffers, Esq. It will consist of six lectures, and will commence on Monday evening, the 21st January next, and be continued on succeeding Monday evenings.

The second course will be "On Music and Musical Instruments," to be delivered by John Hullah, Esq. Arrangements for a third course are in progress.

The lectures will commence each evening at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend to each lecture.

A new list of members of the Society has been printed, and any member can have a copy sent to him on application to the Secretary.

Subscriptions.

The Michaelmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Fourth Ordinary Meeting.

Wednesday, December 12th, 1866; G. Gilbert Scott, Esq. R.A., F.S.A., in the chair.

The following candidates were proposed for election as members of the Society:—

Addis, S. J., 49 and 50, Worship-street, E.C.
Becke, John, Northampton.
Bosanquet, Samuel Richard, Dinastow-court, near Monmouth.
Glendining, Alexander, jun., Redleaf.
Jobson, Robert, 32, Great St. Helen's, E.C.
McCurrick, T. W. Bitterley-court, Ludlow, Salop.

The following candidates were balloted for, and duly elected members of the Society:—

Bruce, Rt. Hon. H. Austin, M.P., Duffryn, Aberdare.
Carter, H. H., Park-valley, Nottingham.
Clarke, William Henry, 5, Size-lane, E.C.
Giffard, Hardinge Stanley, Q.C., Inner Temple, E.C.
Gilbee, W. A., 4, South-street, Finsbury, E.C.
Hooper, George, 246-248, Regent-street, W.
Humby, John, 48, Little Britain, E.C.
Manning, T. E., Eversfield-house, Bratton Clovelley, North Devon.
Rigg, Jonathan, Wrotham Hill-park, Sevenoaks.
Wood, John, Whitfield-house, Glossop.

And as Honorary Corresponding Members:—

Calcabale, Le Commandeur G. B., Consul de Monaco, Naples.
Manfredonia, Prof. Docteur Giuseppe, Naples.
Schvob, Le Docteur Alexandre, Strasburg.
Tortorelli, Le Comte Hercule Malvasia, Naples.

On the table were shown specimens of india-rubber fabrics deodorised by Bourne's process, as well as an arrangement in which this deodorised india-rubber is applied as a "flexible diaphragm" in vessels, with a view of preventing injury to liquids from contact with air when drawn off at intervals. A description will be found at p. 62.

The Paper read was—

ON OLD LONDON; ITS STREETS AND THOROUGHFARES.

By J. G. Grace, Esq.

There are many here, I have no doubt, who are more capable than myself of talking to you about old London; but I was emboldened to take up the subject because I thought that the large collection of plans and views which I possess would enable me to render it interesting to you, and supply, by illustration, the defects of my description. This collection of maps, plans, and views of London was formed by my late father; he laboured at it (it was a labour of love with him) for the last thirty years of his life, and I believe it is considered to be the most complete collection ever brought together; only a very small portion of it is exhibited on these walls, the entire series filling more than fifty portfolios.

At what period London was founded is unknown. There are, of course, various traditions; but it is certain that the City existed before the Roman occupation of Britain. Tacitus mentions in his annals that about 60 years after the birth of Christ it was then renowned for the vast number of merchants who resorted to it, for its widely-extended commerce, and for the abundance of every species of commodity which it could supply. In the "Itinerary" of Antoninus, it is related that 15 iters, or roads, terminate or commence in London.

A reference to the maps will explain the extent of the City and the line of walls built by the Romans, of which many parts are to be found at the present day. These walls were built of stone, with intermediate layers of bricks at certain intervals, in the usual Roman style, and were about 20 feet high and 9 feet thick; the walls were further protected by towers. The course of the wall was as follows:—Beginning at a fort occupying the site of the present Tower of London, the wall was continued by the Minories to Aldgate, thence by a curve to Houndsditch, and by Bishopsgate Churchyard to Cripplegate; then turning southward by Cripplegate Churchyard and Monkwell-street, it approached Aldersgate, and continuing south-west it curved round St. Botolph's Churchyard, Christ's Hospital, old Newgate, and on to Ludgate, then westerly to little Bridge-street, where, turning south, it skirted Fleet Brook to the Thames, where it was protected by another fort. The extent of this wall was about two miles and one furlong.

Another wall, of which no traces now remain, skirted the Thames between the two forts; this measured one

mile and a quarter, and it had two gateways, one at Dowgate, the other at Belins-gate, or, as we now say, Billingsgate.

The relics of Roman London, which are frequently met with at a depth of from 15 to 20 feet, indicate that there were many buildings of considerable magnificence and extent. Tesselated pavements of great beauty have been found in excavating in Leadenhall-street, Fenchurch-street, Lombard-street, Thames-street, and other localities, besides the remains of baths, altars, statuary, &c. London stone is said to have been a Roman milliary, from which the roads were measured as from a centre, as may be seen in the map. This stone is now reduced to a small lump, encased in a hollow pedestal, placed in Cannon-street, against St. Swithin's Church.

The Romans occupied Britain for about 400 years, and retired at last when they found it necessary to withdraw all their forces to protect their own frontiers from the attacks of the northern barbarians. After that we learn that London suffered fearfully from all kinds of ravages, by the sword, by fire, and by plague. It was occupied by the Danes, and taken from them by the Saxons, under King Alfred, yet, notwithstanding all these difficulties, it still preserved a considerable commerce. After the battle of Hastings, London for a time resisted the Conqueror, and the citizens, before submitting to him, exacted a charter, which is still preserved in the City archives. It is finely written, on a slip of parchment, about six inches long and one broad, and translated reads thus:—"William the King greeteth William the Bishop and Godfrey the Portreve, and all the burgesses within London friendly, and I acquaint you that I will that ye be all there law worthy as in King Edward's days; and I will that every child be his father's heir after his father's days; and I will not suffer that any man do you wrong—God preserve you."

It is a remarkable fact that no mention of London occurs in the Domesday Book.

Soon after this period, in the reign of King Henry II., about 1170, we have a most interesting description of London, written by Fitz Stephen, a monk, who was in the household of Archbishop Thomas à Becket, and present at his martyrdom. If you will allow me, I will read you a few extracts from it; it is entitled—"A Description of the most noble City of London.—Amongst the noble and famous cities of the world, this of London, the capital of the kingdom of England, is one of the most renowned, on account of its wealth, its extensive trade and commerce, its grandeur and magnificence. It is happy in the wholesomeness of its climate, in the profession of the Christian religion, the strength of its fortresses, the nature of its situation, the honour of its citizens, the chastity of its matrons, and even in the sports and pastimes there used, and the number of illustrious persons that inhabit it. On the East stands the Palatine Tower, a fortress both large and strong, the walls and body of which are erected upon deep foundations, and built with a cement tempered with the blood of beasts. On the west are two castles, well fortified (Baynard's Castle and Castle of Montfichet), and the City wall is both high and thick, with seven double gates, and many towers or turrets on the north side thereof, placed at proper distances. London once had its walls and towers in like manner on the south; but that vast river, the Thames, which abounds in fish, enjoys the benefit of tides, and washes the City on this side, hath in a long tract of time totally subverted and carried away the walls in this part. On the west again and on the bank of the river, the Royal palace exalts its head and stretches wide, an incomparable structure, furnished with bastions and a breast-work, at the distance of two miles from the City, but united to it, as it were, by a populous suburb. Adjoining to the buildings all round lie the gardens of those citizens who dwell in the suburbs, which are well furnished with trees, are spacious and beautiful. On the north are cornfields, pastures, and delightful meadows, intermingled with pleasant streams, on which stands many a mill whose clack is so grateful to the ear. Beyond them an immense forest extends itself, beautiful with woods and groves, and full of the lairs and coverts of beasts and game, stags, bucks, bears, and wild bulls. This city, on the whole, is doubtless most charming, at least when it has the happiness of being well governed. In respect of the inhabitants, the City may be proud of its inmates, who are well furnished with arms, and are numerous. In the time of the late war, when King Stephen directed a muster, it turned out of effective men no less than 20,000 horse, properly accoutred, and 60,000 foot. The citizens of London everywhere and throughout the whole kingdom are esteemed the politest of all others in their manners, their dress, and the elegance and splendour of their tables; insomuch that while the inhabitants of other cities are styled citizens, they are dignified with the name of barons, and with them an oath is the end of all strife. The matrons of the City are perfect Sabines. The three principal churches in London are privileged by grant and ancient usage with schools, and they are all very flourishing. The followers of the several trades, the vendors of various commodities, and the labourers of every kind are daily to be found in their proper and distinct places, according to their employments; and, moreover, on the bank of the river, besides the wine sold in ships and vaults, there is a public eating-house or cook's-shop. Here, according to the season, you may find victuals of all kinds, roasted, baked, fried, or boiled. Fish, large and small, with coarse viands for the poorer sort, and more delicate ones for the rich, such as venison, fowls, and small birds. There is also without one of the City gates, and even in the very suburbs, a certain plain field, such both in reality and name (Smithfield, or smooth field, as it was anciently called); here every Friday, unless it should happen to be one of the more solemn festivals, there is a celebrated rendezvous of fine horses brought thither to be sold. Thither come, either to look or to buy, a great number of persons resident in the City, earls, barons, knights, and a swarm of citizens."

Fitz Stephen then describes the various diversions of the citizens, such as horse-racing, foot-ball, mystery plays, tilting on horseback, also in boats on the river, archery, boar-hunting, sliding and skating on the ice, all exceedingly well pictured, and worthy of perusal, but too lengthy for me to recite to you on this occasion. Fitz Stephen adds, "To this city merchants repair from every nation in the world, bringing their commodities by sea.

> "Arabia's gold, Sabœa's spice and incense,
> Scythia's keen weapons, and the oil of palms
> From Babylon's deep soil, Nile's precious gems,
> China's bright shining silks, and Gallic wines,
> Norway's warm peltry, and the Russian sables,
> All here abound."

This was London in the twelfth century, a hundred years after the Conquest. It grew and flourished, and, in spite of wars and difficulties of various kinds, it became renowned among the cities of Europe for the importance of its trade, the wealth of its citizens, and the beauty of its buildings.

Thus far we are obliged to depend on written description; there is no known plan or reliable view of London earlier than the 16th century. There are, indeed, fanciful pictures given in an early manuscript of the venerable Bede (see the fac-simile copy), but nothing founded on actual survey.

Now, however, I shall refer to my illustrations, and hope to give you a fair idea of the ancient City such as it was in the time of our Tudor sovereigns and of their successors, the Stuarts.

I shall first refer you to a very interesting view of London, copied from a remarkable drawing by an artist named Van den Wayngerde, which is now in the Bodleian Library, Oxford. It is one of a series of views of cities and interesting places supposed to have been done for Philip the Second of Spain, about 1540. It embraces

at the extreme east, a view of the palace of Placentia, near Greenwich, a favourite royal residence of King Henry the Eighth, Queen Mary, and Queen Elizabeth, and gives every building of importance up to the extreme west, including the palaces of Whitehall and Westminster. Next is the map of Ralph Aggas, the earliest plan known to exist of the City of London. It was published about 1563, though supposed to have been surveyed much earlier, and it corroborates in every material point the view drawn by Van den Wayngerde. After that is a view by Visscher, published in 1615, also giving very interesting views of all the principal buildings.

Then the fine view drawn and engraved by Hollar, similar to the last, and published in 1649. And next is a good clear map by Newcome, well engraved by Faithorne, about 1645, interesting as showing the growth of the City since the time of the Aggas map; and following these are various maps and views of places, to some of which I shall refer in the course of my description. On a map of London as it is at the present day I have indicated by colour the line of the Roman walls, and also the extent of the City in the sixteenth and seventeenth centuries.

With the assistance of the maps and views, now let me attempt to picture to you the old City. We will imagine a traveller journeying from Oxford, to approach the City by the road which is now Oxford-street, then called the way to Tyburn. All is country till he approaches the village of St. Giles. The first object he meets is the gallows; on his right are the hospital and church of St. Giles, and a few scattered houses forming the village; and running southwards is a lane leading by St. Martin's to Westminster. He passes by the road called Holborne (after a brook, the "Old bourne"). He is quite in the country, surrounded by hedgerows, though there is here and there a house; he sees on his right a lane, leading to Drury House, lately built; soon he enters the suburb, houses begin to line the way, he passes a bye-road, sparely built upon, called Chauncery Lane, and on his left is Gray's Inn Lane, leading to fields. He reaches the Holborn Barres, and soon arrives at the brow of the hill, from whence the splendid prospect of the City bursts upon his view. On the right is the Church of St. Andrew, rising picturesquely from the steep declivity, surrounded by trees; on his left are the extensive buildings of Ely House, its great gateway, embattled walls, and lofty chapel, surrounded by pleasant gardens, forming a grand palace for its bishop; on the summit of the opposite hill is the church of St. Sepulchre's, with its lofty tower. In the same line, and over the embattled parapets of the Newgate, he sees the noble church and monastic buildings lately belonging to the Grey Friars, but now to be called Christ Hospital, and above all appears the great cathedral of St. Paul, whose gigantic spire, 520 feet high, rises majestically above its church, the church itself, nearly 700 feet in length, towering majestically with its roofs and pinnacled buttresses high above the mass of gabled houses and numerous churches stretching far beyond. Then he descends the hill, and, crossing the Holborn bridge over the river Fleete, he commences the ascent of Snore Hill opposite, and by Cock Lane he reaches Smithfield, or the "smooth field," "The old town green," from the Conqueror's time downwards, where the Londoners had their favourite games, their tournaments, their horse races; and, sad contrast! where hundreds of poor victims were sacrificed in the name of religion by burning and other dreadful deaths.

Here stood the Priory of St. Bartholomew, founded by the poor jester Rahere, of which the church still remains, further northward is the great Carthusian Convent, founded by Sir Walter de Manny, and afterwards known as the Charter House when converted into a refuge for decayed gentlemen and a renowned school by Sir Thomas Sutton, of whom some poor scholar said—

> "Blessed be the memory
> Of good old Thomas Sutton,
> Who gave us lodging, learning,
> And who gave us beef and mutton."

He was a worthy man, whose prayer should be remembered:—"Lord, thou hast given me a large and liberal estate, give me also an heart to make use thereof."

Beyond the Charterhouse to the north-west is the village of Clerkenwell, where is the great Priory of St. John of Jerusalem, surrounded by pleasant gardens.

Turning now eastward, our traveller passes into Aldersgate-street, on both sides whereof are divers fair houses, the residences of our chief nobility; here be Peter House, Thanet House, and the mansion of the Nevilles, Earls of Westmoreland, besides many fair inns of great resort. He enters within the walls of the City by Aldersgate, and passing where was recently the great sanctuary of St. Martin-le-Grand, he reaches one of the main avenues of the City, called Chepe, now Cheapside. The word Chepe is derived from the Saxon Chepe, a market; at this period it was the principal street of London, lined with picturesque gabled houses. Here were the shops of the chief goldsmiths, the mercers, the drapers, and others. In the words of Lydgate, written in the fifteenth century:—

> "Then to Chepe, I gave drawne,
> Where much people I saw for to stande,
> One offered me velvet, silks, and lawne,
> Another he taketh me by the hande,
> Here is Paris threde, the finest in the lande."

In the centre of the Chepe, opposite Wood-street, stood one of the Crosses of Queen Eleanor, at the west end was placed the little Conduit, and at the east end, near the Poultry, was the great Conduit. The standard in Chepe stood near the Church of St. Mary-le-Bow, or St. Mary de Arcubus, from its being built on arches.

I refer you to an engraving of the "Entrance of Marie de Medici into London" for a curious view of Cheapside, showing very distinctly the whole line of the houses on the north side, as well as the Cross.

The print of the "Procession of Edward the Sixth from the Tower to Westminster," engraved from the fresco at Cowdray, is also interesting, but not exact.

Passing by the Poultry and the Stocks Market (the Covent Garden of that day), our traveller now reaches Cornhill, "so called," says Stow, "of a corn market time out of mind there holden."

Here at the west end Sir Thomas Gresham was then building his New Bourse or Exchange; toward the east stood another fair conduit; and here also was the Standard, with its four spouts of water running different ways; nor must we omit two fine churches, St. Peter's and St. Michael. Next, at the corner of Gracious or Grasschurch-street, stands the vast pile of building called Leadenhall; this was the ancient residence of the Nevilles, and was at that time used as a great storehouse for grain and wool, and for the trappings of the City pageants; beyond this is the church of St. Andrew Under-shaft, in front of which stood the lofty May-pole.

Returning southwards our traveller wends his way, through busy crowds, to East-chepe; this was a market in the old Saxon times, and was famous for its taverns even in those days; here was the Boar's Head of jolly Sir John Falstaff and Prince Hal.

Old Lydgate says of this street—

> "There I hyed me into East Chepe,
> One cryes 'rybbes of befe,' and many 'a pye,'
> Pewter pottles they clattered on a heap,
> There was harpe, pype, and minstrelsye."

We will leave our traveller here to refresh himself, while we turn our attention to the northern outskirts of the City.

A reference to the Aggas map will show that in the sixteenth century there was little building outside the walls of the City. From Aldersgate-street to Bishopsgate-street Without there were fields and gardens, St. Giles' Cripplegate forms a little village, men are shooting in Finsbury-fields, the windmills beyond indicate the position of the present Windmill-street. From Bishopsgate

the street to Shoreditch is lined with houses, on the left will be noticed Bedlam, to the right are the Spital fields, where men are practising archery. Houndsditch is veritably a ditch, with houses on its northern side only, to the west of it is the church of St. Botolph, Bishopsgate, to the east that of St. Botolph, Aldgate; the road to Whitechapel is lined with houses, and there are buildings in Hogges-lane, and a few in East Smithfield; the Hospital of St. Katherine forms a large enclosure, and is "pestered with small tenements," as Stowe says; then we arrive at the Tower. This fortress of our Norman kings is said to have been built upon the remains of the Roman Arx Palatina; the large quadrangular building, called the White Tower, was built, by command of William the Conqueror, by Gundulph.

Here many of our monarchs held their state or fled for safety. It was a fortress, a palace, and a prison, and many a one has passed a weary life within its walls, or left them to be seen no more.

In a volume of poems written by Charles Duke of Orleans, in the reign of Henry VI., and now in the British Museum, is a curious illustration showing the Tower of London, in which the duke was kept prisoner. I refer you to the fac-simile of this illustration, which, in a ubiquitous manner, shows the duke going to the fortress, writing his poems, looking out of window, and taking his departure. The drawing is very interesting, as giving the earliest known view of the Tower, with the bridge, and part of the City beyond. Returning to the Aggas map. Outside the Tower on the north is an extensive field in which women are engaged laying out linen, and on the west corner is the scaffold, which is also shown in Faithorne's map of about one hundred years after.

Now crossing the river we proceed across Horsey down to the Abbey of Bermondsey. This is well shown in the drawing. It was founded by Alwyn Childe, a London merchant, and was one of the most important priories in England.

Two of our Queens retired here to mourn, and here they died—Queen Catherine, wife of Henry V., and Elizabeth Woodville, Queen of Edward IV. On the suppression of the Abbey a house was built on its site in which the Earl of Sussex, in Elizabeth's time, lived and died; all is now cleared away, and the Church of St. Mary Magdalen marks the site of the old abbey.

We will now cross the meadows and proceed to the old High-street of Southwark. This has remained the great highway from the metropolis to the southern ports since the time of the Romans. Till within a few years many of the old inns remained such as they had existed for two or three hundred years, with their old courtyards surrounded by quaint outside galleries. One of these, now called the Talbot, is supposed to have been the old Tabard of the Canterbury pilgrims. How we may picture them as we read old Geoffrey Chaucer—

> "It befell in that season on a day
> At Southwark in the Tabard as I lay,
> Ready to wenden on my pilgrimage
> To Canterbury with devout courage,
> At night was come unto that hostelry
> Well nine and twenty in a company."

Here in this High-street let us picture one of the many pageants that have passed this way.

The hero of Agincourt returns to England after his great victory, where nine thousand half-starved English fought against eighty thousand French. The trumpeters lead the way, blowing loud ringing blasts, then the heralds in their rich tabards. The Lord Mayor and the aldermen, apparelled in scarlet, and four hundred of the Council clad in beautiful morrie, all well mounted, and trimlie housed, with rich collars and gold chains, all the guilds of merchants and great corporate bodies, the clergy of London, with rich processional crosses, sumptuous copes, and massive censers. The Royal standard borne aloft and the banners taken from the enemy. Then the heroes of the fight clad in bright armour and brilliant surcoats, and lastly Harry the king, splendidly accoutred, young, brave, and handsome, and so modest withal, that he would not allow his officers to show in the procession, as they wished, his battered helmet, and his sword bent with the blows upon his enemies. Add to this the magnificent following, and the welcoming shouts of thousands, and we shall not wonder that the old chroniclers speak admiringly of the glorious triumph given to Henry V. after the battle of Agincourt.

Now let us return to our maps and views. In the drawing of Van Wayngerde you will notice a palatial building on the east side of the High-street; that is Suffolk House, the residence of the Charles Brandon, Duke of Suffolk, who married the Queen Dowager of France, sister of King Henry the Eighth. Opposite is the Church of St. George, and further on near the bridge is the grand Church of St. Saviour's, or St. Mary Overie. A monastery was founded here in very early times, and the present church was rebuilt in the fourteenth century. In this church lies buried the poet Gower, and here William Shakespeare buried his brother Edmund, "a player."

Now, turning westward near the river, we find a high-roofed hall; that is Winchester House, once the residence of the Bishops of Winchester, now the vinegar yard of Mr. Potts. Then in Vischer's fine view you will see the Globe, the Bear-garden, and the Swan. The first of them is the theatre where the wondrous plays of Shakespeare were acted; rude-looking structures they are, only partly roofed, and it is difficult to imagine how room was found to represent the plays and hold an audience. In the days of good Queen Bess, I fear that bear-baiting was a more attractive amusement than the drama.

Now, again, we will turn to Van Wayngerde's drawing, to notice his beautiful view of Old London Bridge. A most picturesque object it is. A bridge constructed of wood existed here in very early times, but being burnt, it was resolved in 1173 to build it in stone—a work which it took 33 years to accomplish. The architect was Peter of Colechurch. In the sixteenth century the bridge was crowded with buildings, leaving a narrow street in the centre.

Approaching from Southwark we pass under the Castellated Gate Tower, surmounted by human heads stuck on poles. Then we see a singular building called Nonsuch House, formed of wood much ornamented. In the centre of the bridge, the Chapel of St. Thomas, a picturesque structure, projects on one of the great Sterlings. The whole roadway of the bridge is lined with shops. In one of these, in the sixteenth century, lived a wealthy clothworker, named William Hewet. He had an only daughter, who one day slipping from the arms of her nurse, fell into the surging river. An apprentice of the clothworker, named Osborn, saw the child fall, jumped into the river, and was fortunate enough to save her. You may imagine what followed in after-time. The worthy clothworker was grateful, the daughter was handsome, and so was her dowry. Young Osborn married her, was afterwards Lord Mayor, and the descendants of the apprentice and the daughter of the clothworker became Dukes of Leeds.

Looking eastwards from the bridge, we notice Billingsgate, a small harbour surrounded by gabled houses and an octagon tower. Then a little further on is the Custom House, with, apparently, a very limited business. Then there is the Tower.

Now, I propose to take boat at the foot of the bridge, and by water to view the pleasant palaces, and castles, and convents, which in those days adorned the banks of Father Thames. Many of these were surrounded by pleasant gardens, whose trees were reflected in the clear flowing stream, which was crowded with wherries and pleasure-barges, trimmed with gay coverings—for the river in those days was the great highway between the City and Westminster.

Hither passed the royal barges, with banners spread aloft, and here also the Lord Mayor and great City companies went in procession in their state barges, a glorious spectacle, which was shadowed even in our own days, until a too close economy caused these state barges to be sold, and thus we lost the most picturesque pageant which remained to us.

I will take as my principal guide the view by Visscher, and to render this more intelligible, I have, with the aid of my son, prepared a drawing on a larger scale, which shows more clearly the various buildings I shall allude to.

The first building of importance past the bridge is Fishmongers' Hall; then we see a large structure called Cole-harbour, a corruption of Coln or Cologne harbour, belonging to the Rhenish merchants, and the site of Poulteney Inn, once the residence of the great Duke of Exeter. Next is the Steleyard, or Stele-ale, an exchange for German merchants. Then, passing Dowgate, the Three Cranes, Queenhithe, and other wharfs, we come to Baynard's Castle; this was originally a Norman fortress, often used as a royal residence, and it was here that Richard III. had himself crowned. Then we pass the great monastery of the Blackfriars, and on the other side of the Flete-ditch is Bridewell, at that time a royal palace of great extent; here King Henry VIII. resided with Queen Katherine, pending the trial of divorce. Next is Dorset House, the residence of the Earls of Dorset; and in the garden of this house, nigh the river, was built, in 1670, the Duke's Theatre. Adjoining is the sanctuary of Whitefriars, the Alsatia so well described in the "Fortunes of Nigel;" the hall of the convent was made into the Whitefriars Theatre.

Now we arrive at the Temple buildings, then as now pleasantly situated in a garden; as Spenser says:—

> "Those bricky towers
> The which on Thames' broad aged back doe ride,
> Where now the studious lawyers have their bowers."

Then we see Essex House, where Queen Elizabeth's favourite resided, and from whence he attempted the rebellion which cost him his life. Passing Arundel House, we reach Somerset House, the palace designed by John of Padua for the Protector Somerset, built on the site of the Bishop of Worcester's and other houses; it could have been scarcely completed before he lost his head. King Edward gave this palace to the princess Elizabeth, and Queen Anne of Denmark also resided here.

The next palace is that of the Savoy, the residence of the great Plantagenet Dukes of Lancaster; here the poet Chaucer lived, and was married, and wrote his poems. The mob under Wat Tyler having a special hatred to John of Gaunt, despoiled and burnt it; being rebuilt, it, in later times, became a prison; some parts of it still remain. Then we pass Worcester House, now Beaufort-buildings, and Salisbury-house, now Cecil-street.

The next palace has a special interest for us; it is Durham House, once the residence of the bishops of that see, and afterwards of the ambitious Dudley, Earl of Northumberland.

Few of you probably remember that the house of this Society stands on the grounds, if not on the site, of old Durham House, where poor Lady Jane Grey was married to Lord Guildford Dudley, where she lived, and from whence in a few short months she was taken to the Tower, there soon to lose her head, poor lady! Afterwards, Sir Walter Raleigh resided here, by grant of Queen Elizabeth. Aubrey mentions a turret overlooking the Thames in which Raleigh loved to sit and write. Then it came into possession of Robert, Earl of Salisbury, who took down the stables next the Strand, and built there a new exchange, called Britain's Burse; and about 1770, the brothers Adam (the Adelphi) built the terrace, and the house of this Society was completed in 1774.

Now we pass on to York House, formerly belonging to the Bishops of Norwich, afterwards to the Archbishops of York; then to Sir Nicholas Bacon, and lastly, in the time of James the First, to George Villiers, Duke of Buckingham, whose possession is recorded in George-street, Villiers-street, Duke-street, Of-alley, and Buckingham-street. All that remains is the beautiful water gate of Inigo Jones.

Next is Northumberland House and garden, on the site of what was once the Abbey of St. Mary of Roncesvalles. It was once called Suffolk House, and came to the Northumberland family by marriage.

We pass Scotland-yard, where was formerly a palace of the Kings of Scotland, and then we arrive at the palace of Whitehall. Anciently the residence of the Archbishops of York, it was rebuilt and splendidly furnished by Cardinal Wolsey, and from him it came to King Henry the Eighth, who made it his royal palace, henceforth to be called Whitehall. It continued to be the residence of our sovereigns till 1688, and was destroyed by fire in 1697.

The engraved plan of Whitehall Palace will be found interesting.

Having at last reached the Palace of Westminster, we will land at the Stayres and enter Palace-yard by an arched gateway. Here was a tower of stone, containing a clock with a great bell. Whether this is the one alluded to by old Stowe, which "sowered all the drinke in the towne," I do not know. Near this also stood a fountain which at coronations and great triumphs was made to run with wine out of divers spouts. In the court now called New Palace Yard, the wool staple was held.

I will not attempt a description of the palace or the abbey adjoining, but refer you to the illustrations. The chapel of Henry the Seventh was then in its full beauty, and the towers and other parts of the abbey had not been contaminated (I grieve to use this word) by Sir Christopher Wren.

We will pass under the gates of Holbein, up King-street to the Tilt-yard, the site of the present Horse Guards. On the left is the Cockpit, on which now stands the Treasury. Then we proceed to Charing Cross, where stood the most beautiful of the crosses erected to Queen Eleanor.

Before us we see the Royal Mews, where were kept the hawks of the King. It was afterwards adapted for stabling, and the word mews has since been transferred accordingly.

Looking again northward and westward, we are now again in the country, even up to the period of Faithorne's map. We turn to the left and pass up an avenue called Pall-mall to St. James's Palace. The name of Pall-mall is derived from a game played with wooden mallets and balls, greatly resembling our modern game of croquet. Turning again we see a country lane, called the Haymarket; and continuing our route, we reach a building called the gaming house, and opposite to it is a road running westward, described as "from Knightsbridge unto Pikadilly Hall," and in the Aggas map called "the waye to Reddinge." Proceeding, according to this latter map, across fields where women are laying out linen to bleach, we reach the long acre field, and see the convent garden, enclosed by walls extending from St. Martin's-lane to Drury-lane. Referring, however, to the Faithorne map, we find this space now covered with houses, except a small area, called the Piazza, but which is now Covent Garden. Adjoining is Bedford House and garden, built by the Earl of Bedford, on the remains of the old monastery.

Now we enter the Strand, the high road between the City and Westminster.

On the south side are the various mansions of the nobility bordering the Thames. On the north side there are yet but few houses, as will be seen by referring to the Aggas map.

Opposite the Savoy is the mansion of Lord Burleigh, afterwards called Exeter House, and in after years turned into Exeter Change, a kind of bazaar below, and a menagerie on the first floor. We pass Wych-street,

formerly Ald-wyche, meaning "old farm," where is Drury House, and we reach the block of houses called Butchers'-row, frequented originally by free-trade butchers, in opposition to the City protectionists—a mass of tumble-down houses with projecting fronts, long since removed.

We next come to Temple-bar—not a gateway, but a bar, made to rise and fall, marking the entrance to the City boundary. Beside it is the "Devil Tavern," in which Will Shakespeare and his friend Ben Jonson often caroused.

Entering Fleet-street, the houses are more closely built, their gabled fronts, mounted with carved barge boarding and timber framing, present a varied and picturesque effect. On the left is Chancery-lane, where the Archway of Sir Thomas Lovel had been recently erected, forming an entrance to the Lincoln's Inn, on the site of an old monastery of Blackfriars.

On the south side of Fleet-street lies the Temple, with its ancient church. At the end of Shoe-lane stands the Conduit, erected about 1478, with the figures of angels; and before each are bells, on which are struck by machinery the hours of the day and night. On the right, further on, is the Church of St. Bridget, now called St. Bride's; we cross a bridge over the Fleet River, and pass the great palace of Bridewell. Then, mounting the hill, we enter the City beneath the arch of Lud-gate, and behold again, in all its grandeur, the Cathedral of St. Paul. At the north-western corner is the famous Paul's Cross, whence the most celebrated preachers were accustomed to address the citizens, and where fair ladies sometimes did penance. Thus old Hollinshed tells us of Jane Shore:—"Here, in her penance, she went, in countenance and pace demure, so womanlie, that albeit she were out of all araie, save her kirtle onlie, yet went she so faire and lovelie, that manie good folke that hated her living, yet pitied they more her penance than rejoiced therein, when they considered that the Protector procured it more for corrupt intent than any virtuous affection." The cross was pulled down by order of Parliament in 1643. The engraved view gives a good idea of the place.

The Church of St. Paul was probably the largest in Europe, the spire was quite the highest, but was destroyed by fire in 1561. At this time the old church had been much injured, parts were in bad condition, and parts much abused by throngs of idlers, nevertheless it had glorious reliques; there was a fine tomb of William Bishop of London, in the Conqueror's time, another of John of Gaunt and his wife Blanche of Castille, and the altars still glittered with gold and precious stones; on the southern side was a cloister in which was depicted the "Dance of Death."

Our old dramatists drew many of their characters from Old St. Paul's; here Shakespere found *Pistol* and *Bardolph;* here Jonson met *Bobadil*, "a Paul's man," *Master Stephen*, and *Fastidious Brisk*. But I must not detain you. Let us again look into Chepe. It is Midsummer-Eve, the picturesque perspective of gabled houses, the sculptured cross, and the fountains are dimly shadowed in the twilight. The galleries of the houses and the windows are filled with groups of figures gaily dressed. Presently is heard the sound of trumpets, and a vast flood of light is seen approaching, it is the Festival of the Marching Watch. Onward comes the vast procession, 700 men bearing cressets, and with each a man also to serve it, besides which are 250 constables each with his cresset, about 1,000 cressets in all. Mingled with these come 2,000 of the marching watch, some on horseback, some on foot; demi-lances on great horses, gunners with their harquebusses and wheel-locks, archers in white coats, with bows bent and sheafs of arrows by their side; pikemen in bright corslets, and billmen with aprons of mail; following these came the constables of the watch, each in bright harness flaming from beneath his scarlet jornet, and with golden chains. Then came the waits of the City, and morris dancers footing it to their merry notes, and then the Mayor himself on horseback, his sword-bearer, his henchman, his harnessed footmen, his giants and his pageants; then the sheriffs in like order; onwards sweeps the mighty cavalcade amidst the assembled multitude lining the broad avenue of the Chepe; and so has passed one of the most picturesque pageants of the olden time.

Thus I have endeavoured to picture to you old London as it existed in the 16th and early part of the 17th centuries.

Sad changes were soon to come upon the old City. Firstly, the great plague, which in 1665 carried off about 70,000 victims, about one-fourth of the whole population; grass grew in the streets, which became silent and deserted; and in 1666 occurred that awful calamity the fire, which almost entirely destroyed the City. Evelyn, in his diary, gives a trustworthy account of it, from which I will read an extract:—

"Sept. 2nd.—This fatal night, about ten, began the deplorable fire neere Fish-street in London.

"Sept. 3rd.—I had public prayers at home. The fire continuing after dinner, I took coach with my wife and sonn and went to the bank side in Southwark, where we beheld that dismal spectacle, the whole Citty in dreadful flames neare the water-side; all the houses from the bridge, all Thames-street, and upwards towards Cheapside, down to the Three Cranes, were now consumed; and so returned exceeding astonished what would become of the rest. The fire having continued all this night (if I may call that night, which was as light as day for ten miles about, after a dreadful manner) when conspiring with a fierce eastern wind in a very dry season, I went on foot to the same place, and saw ye whole south part of ye city burning from Cheapside to ye Thames, and all a long Cornehill (for it likewise kindled back against ye wind as well as forwarde) Tower-streete, Fenchurch-streete, Gracious-streete, and so along to Bainard's Castle, and was now taking hold of St. Paul's Church, to which the scaffolds contributed exceedingly. The conflagration was so universal, and the people so astonished, that from the beginning, I know not by what despondency or fate, they hardly stirred to quench it, so that there was nothing heard or seene but crying out and lamentation, running about like distracted creatures, without at all attempting to save even their goods, such a strange consternation there was upon them; so as it burned both in breadth and length the churches, public halls, exchange, hospitals, monuments, and ornaments, leaping after a prodigious manner from house to house, and streete to streete, at greate distances one from ye other; for ye heate with a long set of faire and warme weather, had even ignited the air, and prepared the materials to conceive the fire, which devour'd after an incredible manner houses, furniture, and everything. Here we saw the Thames covered with goods floating, all the barges and boates laden with what some had time and courage to save, as, on ye other ye carts, &c. carrying out to the fields, which for many miles were strew'd with moveables of all sorts, and tents erecting to shelter both people and what goods they could get away. Oh the miserable and calamitous spectacle! such as happly the world had not seene the like since the foundation of it, nor be outdone till the universal conflagration of it; all the skie was of a fiery aspect, like the top of a burning oven, and the light seene above 40 miles round about for many nights. God grant mine eyes may never behold the like, who now saw above 10,000 houses all in one flame; the noise and cracking and thunder of the impetuous flames, ye shrieking of women and children, the hurry of people, the fall of towers, houses, and churches, was like an hideous storme, and the aire all about so hot and inflamed that at the last one was not able to approach it, so that they were forc'd to stand still and let ye flames burn on, which they did for neere two miles in length and one in bredth. The clouds also

of smoke were dismall and reach'd upon computation neer 50 miles in length. London was, but is no more!

"Sept. 4th. The burning still rages, and it was now gotten as far as the Inner Temple; all Fleet-streete, the Old Bailey, Ludgate Hill, Warwick Lane, Newgate, Paules Chaine, Watling-streete, now flaming, and most of it reduc'd to ashes; the stones of Paules flew like granados, ye mealting lead running down the streetes in a streme, and the very pavements glowing with fiery rednesse, so as no horse nor man was able to tread on them, and the demolition had stopp'd all the passages, so that no help could be applied. The eastern wind still more impetuously driving the flames forward. Nothing but ye almighty power of God was able to stop them, for vain was ye help of man."

400 streets, 89 churches, 13,200 dwelling-houses, all the old conventional buildings and castles, most of the city halls, and the great cathedral, all were consumed by this dreadful conflagration.

This was the end of old London.

DISCUSSION.

Mr. G. C. T. Bartley suggested that the great labour bestowed upon this interesting subject by Mr. Crace, and by his father before him, and the vast amount of information collected by them, might be rendered still further interesting to the present generation of inhabitants of London by tablets being placed in such localities as were remarkable as the sites of famous buildings or historical events, or were noted as the residences of great men of past ages. Such tablets, he suggested, might indicate briefly the points of interest. The same remarks applied to events of more recent date than those treated of in the paper. The City of London, he observed, abounded in objects of antiquarian and historical interest, and every wayfarer travelling on foot or driving through the metropolis would be enabled, by the means he proposed, to read the history of olden times with interest and instruction. This plan had been adopted to a considerable extent in many of the towns of the Continent; in Boulogne, for instance, might be seen a tablet indicating the residence of the author of Gil Blas. To do this in London would of course be a work of time, but when accomplished it would be a source of gratification to those who engaged in it. The Society of Arts, he was happy to say, had taken this work into their consideration, and a committee of the Society was now engaged upon it; and he hoped that shortly a commencement would be made.

Mr. Bishop said he believed the original name of London signified a town on a lake. At the period when that name was used, the south side of the Thames was under water every tide, forming a lake.

Mr. Crace remarked that there were no fewer than forty-eight different names, with their derivations, given in the various works on ancient London; and as they were so numerous, and in some cases so very imaginative, he thought on the whole it was better to abstain from giving any of those appellations.

Mr. J. M. Drach said the original London Stone was now in Pannier-alley, and marked the highest spot in London.

Mr. Black said there was no doubt the old London Stone had been removed from the spot where it originally stood, according to the survey of London made after the great fire of 1666. With regard to its being of smaller size than the original, he believed there was but little, if any, difference. He was inclined to the belief that instead of being a point from which distances were measured, it was rather a geometrical point of the Roman surveyors, and that it was never regarded as a mile-stone at all. He thought Mr. Crace was under the impression that the portion of the City called Newgate was so recent that he did not take his traveller into London that way; but when Skinner-street was blocked up, all who wished to enter that portion of London did so by a very old thoroughfare, passing over the Fleet to the north-west part of Smithfield. From that point the ancient traveller went down Holborn-hill and traversed London from west to east, entering by Chamberlain-gate, since called Newgate. It was one of the most ancient gates of London, and the present Newgate-street, though greatly altered, was the old Roman street leading from that gate.

Mr. W. Botly had been struck with the remarks in the paper with regard to the conduits of old London. It was probable that those conduits had some architectural pretensions; but if they had waited for such conduits to be placed in the spots now marked by the existing humbler drinking-fountains, a great benefit would have been lost to the present generation of inhabitants of London. He would give all thanks to those benevolent individuals who had done so much for the sanitary improvement of London, by establishing the present drinking-fountains, which, for his part, he should like to see more numerous. He hoped Mr. Crace's remarks on that subject would not throw a damp upon those persons who were inclined to further that work, and add to the water supply of the City. He had seen thousands drinking of those waters, and at the time of the cholera epidemic the numerous drinking fountains yielding fresh and good water were amongst the best promoters of health that existed. He hoped the number of those conduits would be multiplied all over London, and in his opinion they contributed, as far as they went, to the ornamentation of the streets.

Mr. R. Rawlinson, C.B., would point out to all persons desirous of studying what ancient London was, that besides the maps and illustrations on the walls, and the information given by Mr. Crace in his most interesting paper, they could get an excellent idea of ancient London, and a clear insight into the comforts and miseries of its inhabitants of those days, by visiting many of the continental cities of the present day. In Copenhagen, in Constantinople, and other cities, might be seen the types of ancient London at various periods. Within the last 200 years in this country there had been rapid advances in civilization. London at the present time, with its huge aggregation of buildings, was regarded as the healthiest great city in the world. In former periods it was well known that not only London but most other ancient cities were the reverse of healthy; and if, with the beautiful description of ancient London they had listened to, the student wished to have a correct understanding of the state of things at the period referred to, he would ask him to pay a visit to Constantinople, which, he believed, at the present time, gave a very fair specimen of what the London of the time of Charles the First might be supposed to have been—narrow, intricate streets, no sewering, no public lighting, no scavengering—all the refuse thrown from the court-yards into the streets—the dogs the only scavengers, the rain the only cleanser—the pavement of the roughest description, consisting of boulders two or three feet across, interspersed with stones not larger than the hand. The wonder was that horses could pass over such a surface at all, whilst wheeled vehicles were certainly out of the question as a means of locomotion. To understand what old London was at various periods, he would ask them to visit some of the cities of northern Europe. Copenhagen might be given as illustrating one period, Stockholm another period, and some of the Russian cities another period, and they might gather from those what this country was 300, 500, and even 1,000 years back. With all this picturesque description of ancient London they had heard, it appeared that the main thoroughfares were almost impassable for mud. Going back only to the time of the *Spectator*, and even later, they found the old watchmen in existence; mohawks prowled about the streets at night unmolested, and life had very little value and less protection. He therefore thought the glowing descriptions given by early writers must be taken with a good many grains of salt. He should like to hear a description of the progress made since the period treated of in the paper. There was a gentleman

in the room (Mr. Haywood) who, he hoped, would, on some occasion, give them a description of what modern London had become under his superintendence. Nothing could be more interesting than a history of the material progress of the great metropolis. He would say one word on the subject of drinking fountains. He disagreed with Mr. Crace on that point, and he sincerely hoped that gentleman's suggestions would never be carried out. Fountains, on the scale Mr. Crace suggested, however ornamental, would be to him (Mr. Rawlinson) an eyesore and a nuisance, so long as they did not contribute to the material benefit of the inhabitants of this great city. The humble drinking fountain, with its single water dish, where the wayfarer could take his drink, was, in his opinion, incomparably better than the Trafalgar-square squirts, which served no purpose but to wet the pavement on windy days, and become receptacles for all kinds of rubbish. Mr. Crace probably had not studied the sanitary part of the question so much as he (Mr. Rawlinson) had been obliged to do. His opinion with regard to baths and wash-houses, as well as fountains and all similar matters, was, that money ought not to be thrown away in buildings of a magnificent character. Many failures of baths and wash-houses had taken place from erecting stately buildings, to which the poor would not go, or from placing them in situations where they were not wanted. He would say, let such buildings be of the plainest and least expensive kind, but with the best appliances for the purposes they were intended, and let them be placed where they were needed, in the most crowded localities, and let them there be multiplied, as they might be at a twentieth part of the money which had been expended upon some of these buildings. He had listened with the greatest pleasure to Mr. Crace's interesting paper; he feared he (Mr. Rawlinson) had wandered somewhat from the subject, but he hoped he should be followed by others who would speak more to the point than he had done.

Mr. J. Beavington Atkinson would allude to one or two points mentioned in the paper. One was as to the great elevation of the surface since the time of the Romans. They were told that Roman London was from 15 to 20 feet below the present surface. He believed that was the common experience of all ancient cities throughout the world. In Rome itself there was about the same rise of level as was the case in London. The ancient Roman Forum was 15 or 20 feet below the present surface. A similar rise of surface was found in modern Jerusalem. Ancient Jerusalem was from 10 to 40 feet below the modern level. This, he thought, was a general law, and might to some extent be accounted for by the simple fact that in all cities more material was brought into them than was taken out of them, and when buildings decayed or were destroyed the *debris* were not always removed. It occurred to him that the comparative antiquity of London was not so very remote. There was another point of great importance, on which he hoped the chairman would be induced to give the information which he was so thoroughly able to impart; that was in reference to the restoration of the Chapter-house of Westminster Abbey, now in progress. The researches of Mr. Gilbert Scott had resulted in the discovery not only of points in the architecture of that building which were not known before, but also of paintings of rare beauty, rivalling that of the early Italian school. The work of restoration of those paintings, he feared, would be one of great difficulty. In some cases whole panels were so obliterated that restoration was out of the question. As a lover of ancient art, he hoped to hear from the chairman that, as far as possible, these paintings would be restored and preserved as works of art of the most invaluable character.

Mr. G. B. Galloway thought, however interesting the history of the past might be, practical minds would rather direct themselves to what might be done for the advancement of the present age—taking advantage of past experience. He had hoped to have heard something respecting the noble design of Sir Christopher Wren, for the improvement of the City after the Great Fire; if that design had been carried out London would have been very different from what it now was. Interesting as it might be to record the sites of notable eminent buildings, and the residences of famous men of past ages, he thought it was more interesting to foster and develop the practical sciences of the day for the benefit of existing populations, than to talk of men who had passed away, and of things which had been.

Mr. P. Palmer thought they had talked more of what London ought to be than the subject of the paper, viz., what it was previous, and up to the 15th and 16th centuries. With reference to the comparison instituted by Mr. Rawlinson between the condition of ancient London and at the present period, he would remark that the highway alluded to as being in so deplorable a state of mud —viz., the Strand, from Temple Bar to Charing Cross— was not at that period the great highway of the citizens, inasmuch as the river was then the great highway. The times were changed now, and it was the Thames that now was open to reproach. They had not then the advantages of a Metropolitan Board of Works or City Commissioners of Sewers. At the same time they could hardly suppose that the citizens would walk the streets in silken doublet and hose, unless some regard had been paid to the cleansing of them. On particular occasions the streets were strewn with rushes, and every precaution was taken to enable the citizens to walk clean. With regard to the public conduits, he thought the purpose for which they were erected was misunderstood. In the absence of all other water supply to the City, it might be supposed that these conduits were the great magazines from which water was distributed to the inhabitants, and constituted a continuous water supply, a desideratum not accomplished in the present day. Mr. Crace had brought before them the fact that in the place of these noble conduits we had the little fancy fountains, which were placed in different parts of London, no doubt erected with very laudable intentions, though, so far as his (Mr. Palmer's) experience led him to believe, they were little used by the working men. On the subject of recording the sites of celebrated buildings and localities remarkable for historical events, or the residences of eminent men, as advocated by the first speaker, it occurred to him that the object would be much better attained by placing obelisks in certain quarters, on which could be inscribed the records of the neighbouring localities. Perhaps, better than all, the various vestry halls would be good places for such information to be recorded. The situations where the tablets would be erected were very often in retired back streets, little frequented by the public, and it was for this reason he advocated the erection of obelisks where the passer by would more readily take note of them.

Mr. Ash mentioned that twenty-five years ago he saw a fragment of the old Fleet-bridge which had been buried by the raising of the valley, and he suggested that a collection of such relics would be of great interest to antiquarians.

Mr. J. A. Nicholay said they had heard a good deal of ancient London; he would for a moment call attention to the London of the present day, and what it was likely to be in the future. He pointed with pride to colossal buildings in every direction, which vied with those of Paris or any other continental capital; to the vast scheme which had to a great extent been carried out for the drainage of London, and which had been executed on a scale calculated to meet the wants of generations yet to come; also to the great work of the embankment of the Thames now being prosecuted. All these, added to the other great public works now going on, were matters of which modern London might well be proud.

The Chairman said he had now to call the attention of the meeting to what was due from them to Mr. Crace,

and he was quite sure it needed no words from him to induce them to return their most hearty thanks to that gentleman for the comprehensive and extremely interesting paper he had favoured them with. The paper which Mr. Crace had written was a hasty but most masterly sketch of London through a period of almost 1,600 years, commencing, as it did, from about 60 years after Christ and extending down to the year 1666, where, as he said, Old London came to an end. To have drawn a sketch at once so vividly coloured, and so rapid, could only be possible to a man who had every fact ready to hand for use at a moment's notice, and that could only be the result of a life-long study of the subject. He did not say that Mr. Crace himself had devoted a life to it, but what he and his father had done together combined the work of a lifetime, and it was only by that means he had been able to lay this beautifully coloured and brilliant sketch before them, in which the whole history of London had passed before them throughout those sixteen centuries. Many of the pictures presented to them were most agreeable; and he had no doubt the agreeables and disagreeables were then, as compared with the present day, pretty equally balanced. They were always making improvements, but in some respects, as one of the speakers had said, they did not make the improvements they ought to do. He had no doubt the way by land from Westminster to London was more muddy in old times than it was now, but the old road—the Thames—was now a great deal more muddy than it was then; and he agreed with Mr. Nicholay it was a very great work which was being carried on by the Metropolitan Board of Works—the rendering old Father Thames again free from the muddy condition in which it was presented to them in the present day. Mr. Crace had rightly said that old London came to an end at the Great Fire of 1666. Happily, however, though it did in a certain sense come to an end, it left many interesting relics behind it. Time did not admit of Mr. Crace calling their attention to all the numerous relics of old London which still existed. Amongst these were some to which his attention had been more particularly called as an architect, and those he would briefly pass in review. Within the last few years some parts of the old Roman walls of London had been laid bare, and most interesting they were found to be; but, as he had not seen them himself, he would not speak further of them. Then they came to the Tower of London, built on the site of the ancient Roman citadel, and in itself containing probably the largest keep in Great Britain, built by the Conqueror himself and the great architect of the day, Bishop Gundulph. That keep, though much damaged by the enlargement of the windows and other alterations, was still most interesting, and still retained its beautiful chapel. A more perfect representation of a small and beautiful church of the early Norman period could scarcely be found anywhere. It had lately been partially restored, and was a perfect model of a church, on a minute scale, of that period. Then the Tower contained numerous other remains. The old gateways and numberless other portions were of the highest historical and antiquarian interest, many of them rendered sacred by inscriptions carved upon their walls by great and often good men immured within its dungeons. Then he would mention the remains of St. Bartholomew's Church, in Smithfield, the work of Rahere, the jester, its "first canon, and first prior." That church, he believed, was begun about the year 1107; the whole of the choir remained, and it was now undergoing restoration. He had no doubt a great many persons had lived in London for years without having seen this church. Some remains of the monastic buildings still existed, but he remembered the time when more of the ancient accompaniments of the church were standing (including the walls, to a certain height, of the chapter house), but they were destroyed by a fire among surrounding buildings in the year 1830, and the remains of the cloister had been subsequently taken down. Not far from thence were the remains of the gateway of the old monastery of St. John of Jerusalem, the outline of which was familiar to them from its forming the embellishment of the cover of the *Gentleman's Magazine*. Then there was that most beautiful monument, the Temple Church, the round part of which he would say was one of the most beautiful remains of the period of Fitz Stephen, and of the great transition from Norman to Gothic architecture. The choir was a most beautiful remnant of fully developed early pointed architecture. The exterior had been recently brought out to view by Mr. St. Aubyn, the architect to the Inner Temple, and the north side was particularly interesting. The internal beauties of that church, as restored some years back, were probably known to most present. Then there was the old church of Austin Friars, which narrowly escaped destruction by fire, and had been recently restored. Then they came to old Ely Chapel—the chapel of the London palace of the old Bishops of Ely—a most beautiful chapel, though dreadfully mutilated, of the date of about 1290. Then there was St. Helen's Chapel, Bishopsgate, and a number of old churches not so famous for their architecture as for the monuments they contained, many of which, if not of high antiquity, were of great interest. Amongst the secular buildings, they had the great Guildhall, the roof of which, destroyed in the great fire, had been recently restored very much in its ancient form. Then there was the charming old hall of Sir John Crosby's house in Bishopsgate, a beautiful specimen of the architecture of the 15th century. There had been till recently the remains of Gerard's Hall, but they were destroyed, ruthlessly he was afraid, not many years ago. He would mention one interesting little piece of antiquity which he had accidentally met with. In the construction of the railway at Farringdon-street the excavation laid bare, on what seemed to be the site of one of the wharves on the Fleet, a kiln for burning the encaustic tiles which decorated the floors of ancient churches, and by the side of it was discovered a heap of spoilt tiles just as they had been thrown aside and left there. They had no remnants remaining of old London Bridge, but many present no doubt remembered it well. He went over it at the time of its demolition to make room for the new bridge, and he made a sketch of a curious little chapel in one of the piers. Beyond the bridge they came to the noble Church of St. Mary Overy, better known as St. Saviour's, a most noble early English church on a grand scale. The Lady Chapel and the choir were carefully restored 30 odd years ago by the late Mr. Gwilt, who was most anxious to restore the nave also, but, unfortunately, the roof was a little decayed. The parish employed a surveyor, who cared nothing about antiquities. The roof was taken down, and the nave, after being exposed to the ravages of several winters, was ruthlessly swept away, and there was erected on its site—perhaps considering what it had supplanted—the most wretched structure that ever disgraced London. Then passing along the south side of the Thames they came to old Lambeth Palace, one of the most magnificent of the few remains of the many Episcopal palaces which existed all over the country in olden times. It retained its beautiful early English chapel and the hall of the fourteenth century, besides many other highly interesting portions. Last of all, though not exhausting the list, he came to Westminster Abbey, than which a more glorious monument of the architecture of the middle ages could not possibly be found. Externally, as they were aware, this structure had been very much damaged by decay and reparation. It had been refaced and restored till almost every vestige of the ancient work was gone; but internally it challenged for beauty every church he had ever seen in Europe. Looking at it from an antiquarian point of view, it contained considerable remains of the church and monastic buildings built in the late years of Edward the Confessor. Within the last few months

there had been discovered, while removing portions of the pavement, the bases of several pillars of the Confessor's Church; and extensive remains of the same age existed in many of the other buildings of the Abbey. Then, again, they had considerable remains in the Norman chapel of St. Catherine, and the church itself was the most glorious specimen of the most highly developed architecture of the thirteenth century to be found in this country. One of the speakers had called attention to the Chapter House, the interior of which had, until lately, been almost hidden, but was now more thrown open to view, and an inquiry was made respecting the paintings there. He (the Chairman) would say, that in his opinion these paintings ought not to be touched with any idea of attempting to restore them, and, if their decayed state detracted from the artistic effect of the building when restored, the fact that what remained was authentic and untouched would amply compensate for any loss of that kind. With regard to the interior of the Chapter House, he thought there was but little wanting really to enable them to restore it perfectly to its old form. He did not mean by *restoring* the scraping it over and making it look new; all he should do was to restore those parts which had been ruthlessly destroyed, or from other causes lost. Everything now in its place he would leave untouched. Externally the same rule could not be applied, for it had utterly perished, and there was hardly a piece the size of his hand which retained its ancient form; therefore, they must make the exterior practically a new building. Internally, he hoped a large proportion would be the true Chapter House which was erected by Henry III., in 1553. Westminster Hall might be mentioned as one of the most magnificent banqueting halls ever erected. It was first built by Rufus, and brought to its present state by Richard II. The Chapel of St. Stephen had, unfortunately, passed away. It was cased round with wainscoting when used as the House of Commons, and at that time they could see nothing of the internal architecture or decoration; but when this casing was swept away by the fire it seemed like a phœnix rising out of the ashes, for then its beauties came out most gloriously. Antiquaries present were aware that copies of the exquisite paintings which covered every part of its walls, made by John Carter some 60 or 70 years back, were published by the Society of Antiquaries. Those paintings came out to view after the fire, and were as clear as those around the room in which they were assembled. But in an evil day it was determined that that chapel should be taken down, though he and many others strongly protested against it. Happily the crypt beneath remained, and that had been very beautifully decorated by Mr. Crace under Mr. Barry, the architect. The only other antiquity of importance connected with the Palace of Westminster remaining, and which hundreds did not know was an antiquity at all, because it had been scraped and made to look new, was the beautiful cloister of Henry VII.'s time, which was the cloister of the canons of St. Stephen. It was a cloister of two storeys, and an apsidal chapel projected into the courtyard from the western side on each storey. He would allude once again to that great but lost structure of the middle ages, old St. Paul's. Those who were interested in that magnificent building would do well to consult the description given of it in Dugdale's book, as well as the numerous views of it such as those now exhibited by Mr. Crace. He believed he was correct in saying it was in its day the largest and loftiest cathedral in Europe. Its steeple overtopped those of Strasburg, Vienna, or Antwerp, and its beauty was proportioned to its magnificent extent. The nave and transept were early Norman, of the character of Durham, Ely, and Peterborough, and other great Norman cathedrals. Its choir was, in character and date, like that of Westminster Abbey, though without its apsidal termination, and its eastern chapels. On the whole, it was one of the proudest monuments of mediæval art. There had arisen in place of it a magnificent building; but they could not but regret that they had lost so glorious a structure connecting them with bygone ages. The Chairman concluded by moving a vote of thanks to Mr. Crace for his able and interesting paper.

The vote of thanks having been passed,

Mr. Crace expressed his acknowledgments for the kind manner in which his paper had been received by the meeting. To those gentlemen who had favoured him with observations upon it he would only say the paper was essentially one on old London. He had purposely abstained from making any comparisons. He meant to confine himself to old London, without referring in any way to Sir Christopher Wren, and his most desirable plan for the restoration of London. With regard to the observations of the gentleman who seemed to object to these retrospects of the past, he would say he thought there was a luxury in reflecting upon the monuments of the past, those connected with the past history of the City in which they dwelt. With regard to London Stone, it was not a milestone, but a milliary, a point from which all miles and distances were calculated; and it was placed in its present protected situation 200 years ago. It was no doubt much diminished in size since the time when Jack Straw put his sword upon it and said, "This is London Stone." All, he would add was, that if some one would be good enough to favour them with a paper on London in the time of the *Spectator*, it would form a continuation of a history which must always be interesting to them; and this might be followed by our bringing down to our own day the history of the great city in which we lived.

Proceedings of Institutions.

Lancashire and Cheshire Union of Institutes.—*Rawtenstall Mechanics' Intstitute.*—The annual *soirée* of the Rawtenstall Mechanics' Institution was held on Saturday evening, Nov. 24th. R. H. Hardman, Esq., J.P., occupied the chair. The report stated that the present year commenced with a balance of £59 15s. 2d. due to the treasurer. The gentlemen of the neighbourhood, however, had contributed £94 2s. 6d. towards its liquidation. After the current expenses had been paid there would be a balance of £20 in favour of the Institution. The reading-room is supplied with seven daily papers and seven periodicals. The library consists of 1,440 volumes; 1,819 volumes had been circulated during the past year. Efforts are being made to secure the services of the organising master of the East Lancashire Union, with a view of greatly extending the operations of the evening classes. The results of the examinations in connection with the Union of Lancashire and Cheshire Institutes had been very satisfactory. After the report had been read Colonel Wilson Patten, M.P., delivered an address, and then distributed the prizes and certificates obtained by the successful candidates. Addresses were also delivered by J. Robinson Kay, Esq., J.P., Thomas Lawton, Esq., visiting agent of the Lancashire and Cheshire Union of Institutes, J. B. Whitehead, Esq., J.P., Mr. Alderman R. H. Hutchinson, Captain Aitken, &c.

Marlborough Reading and Mutual Improvement Society.—A dramatic recital of comic chapters from Dickens's "Barnaby Rudge" was given recently by Mr. Walter Rowton, of London, in connection with the above society, in the Town-hall.

DEODORISING INDIA-RUBBER.

The extremely disagreeable odour attaching to india-rubber manufactures, and the power possessed by them of imparting a nauseous taste to liquids or other sub-

stances, has long been a difficulty in the way of its use for many purposes for which india-rubber is peculiarly adapted. To obviate this evil many expedients have been resorted to, but none hitherto with perfect success, and this on account of the strong tendency which india-rubber has to acquire and retain odours. The new process invented by Mr. S. Bourne depends upon the still greater affinity possessed by charcoal, especially animal charcoal, for all kinds of odours, and its great capacity for the absorption of gases. The practical difficulty lies in so using the charcoal as not to injuriously affect the articles with which it may be brought in contact, and this has now been overcome by very simple means.

The mode of application necessarily varies according to the description of articles which are thus treated. Generally speaking, they are laid in shelves or trays in a hot chamber, with a thin stratum of charcoal beneath and on top, and exposed to a temperature of from 120 to 180 degrees for from three to six hours, after which they are removed from the charcoal, having sustained no other alteration than the all-important one of being rendered devoid of smell and incapable of imparting any taste to liquids or other substances they may touch. Under proper management the most delicate textures can be thus dealt with without being impaired either in substance or appearance. The most convenient mode of applying heat is by hot water or steam surrounding the vessel or chamber in which they are placed. One very considerable advantage of this process is that, for a large number of vulcanized articles it can be carried on in co-operation with the heating or curing by which the vulcanization is effected, and they leave the chamber at once free from odour. It is equally applicable to india-rubber in sheet, spread fabrics, or the garments and other articles made therefrom when fully made up, such as the ordinary "macintosh" clothing, air and water cushions, &c. The use of this process enables the inventor to produce his "flexible diaphragms" (which were first brought before the public at the Dublin Exhibition, where they obtained a prize medal) in so pure a state that they may be at once used with the most delicate wines and other liquids. The diaphragm itself is a contrivance for the division of casks or other vessels into two separate chambers, by means of a flexible partition, which fits to the upper or lower part of the vessel alternately, or into any intermediate position, so that whatever the quantity of liquor contained within it, the air (though still exercising its pressure through the medium of the diaphragm) is separated from it by an impervious shield, and thus the injurious effects of exposure to atmospheric influence are altogether avoided, and any portion of the liquor may be withdrawn at pleasure, and as often as may be, without any admission of air to the remaining portion. In this way vessels of wine and beer are stated to have been actually kept in constant use for six and twelve months without any fermentation or formation of acid resulting. It is equally applicable to other liquids for domestic use or for medicinal or scientific purposes, the fluid remaining as completely secured as if the vessel were actually full.

An adjunct to this invention, and which permits also of independent use, is in the elastic valves, in two varieties—the one for giving vent to the products of fermentation, when desired, such as the carbonic acid gas generated by malt liquors, &c., the other for giving admission to air, so as to enable the liquid to flow through the tap or other orifice. In the one case a circular disc of vulcanised india-rubber is made to cover a small opening through which the gas is free to escape, but meets in its passage with the india-rubber, which being forcibly held down round its edge is at liberty to become distended, and in so distending opens a number of very minute holes which have been previously pierced throughout its surface. When the pressure is removed, the disc again becomes flat and its orifices shut. The degree of pressure to be sustained before these perforations open is perfectly under control, and may be adjusted to any required degree.

In the other form a small cylinder of India-rubber, closed at its lower end, is drawn over a corresponding cylinder of wood with a hole through its centre, and then tightly bound at its upper edge. The india-rubber has a number of slits made in its substance, which (when any orifice through which the liquor may flow is opened) receives the pressure of the air, and yielding to this, open, so as to let the air enter the vessel to exactly the same extent as liquor is withdrawn. When the flow of liquor is stopped, the edges of the slits become drawn together, so as to prevent any escape of liquor or gas in a wrong direction. Should there be any pressure from within upon the surface of the india-rubber, this will only tend to the more perfect closing of the slits, and thus, while affording sufficient ingress, altogether restrain egress.

PARIS EXHIBITION OF 1867.

The Imperial Commission has announced the completion of its list of Jurors for the awards.

The special jury appointed, on the part of France, to award the prizes to be given to the originators or organisers of those industrial establishments which shall have produced the greatest amount of harmony amongst employers and employed, and thereby aided the physical, mental, and moral improvement of the working classes, consists of:—M. Rouher, Minister of State; M. Béhic, Minister of Agriculture, Commerce, and Public Works; Marshal Vaillant, Minister of the Emperor's Household and of the Beaux Arts; M. Migne, Member of the Privy Council; the Archbishop of Paris; M. Schneider and M. Alfred Le Roux, Vice-Presidents of the Corps Legislatif; M. Paulin Talabot, Deputy; and M. Le Play, Councillor of State and Commissaire-General of the Institution.

The following is the list of Presidents and Vice-Presidents of the Juries of the nine Industrial Groups, forming the French portion of the Superior Council of Jurors:—M. Elie de Beaumont, Senator and Perpetual Secretary of the Academy of Sciences; M. Denière, formerly President of the Tribunal of Commerce of Paris; M. Arlès Dufour; M. Michel Chevalier, Senator; M. Dupuy de Lôme, Councillor of State, &c.; M. Lefuel, Member of the Institute; M. le Duc d'Albufera; M. Dumas, Senator, Member of the Institute; M. Kuhlmann, President of the Chamber of Commerce of Lille; M Devnick, formerly President of the Tribunal of Commerce of Paris; and M. Jean Dollfus, Maire of Mulhouse.

The following is the list of Class Jurors:—

Class 6.—*Printing and the Library.* — MM. De la Guéronnière, and Derenémesnil, of the Imprimerie Imperiale.

Class 7.—*Stationery, Bookbinding, and Artistic Materials.*—M. Quicherat, Member of the Institute; M. Roulhac, merchant.

Class. 8.—*Application of Design in the Ordinary Arts.*—M. Baltard, Member of the Institute, architect; Ed. Taigny.

Class 9. — *Photography.* — Count Olympe Aguado; M. Nièpce de St. Victor.

Class 10.—*Musical Instruments.*—General Mellinet, senator, &c.; M. Ambrose Thomas, composer.

Class 11.—*Medical Apparatus, &c.*—Dr. Nélaton; Dr. Tardieu.

Class 12.—*Instruments of Precision and for the study of the Sciences.*—M. Milne-Edwards, Member of the Institute; M. Foucault Edwards, Member of the Institute.

Class 13.—*Maps, Charts, and Geographical Apparatus.*—Vice-Admiral Paris, Member of the Institute; Col. Ferri Pisani, of the Etat-Major.

Class 14.—*Artistic Furniture.*—M. Du Sommerard, Director of the Museum of Cluny; M. Williamson, Administrator of the Mobilier de la Couronne.

Class 15.—*Upholstery and Decorative Work.*—M. Gustave de Rothschild; M. Diéterle, decorative painter.

Class 16.—*Crystal and Stained Glass.*—M. Peligot, Member of the Institute; M. George Bontemps, formerly manufacturer.

Class 17.—*Porcelain, Faiences, &c.*—M. Regnault, Member of the Institute, director of the Sèvres works; M. Dommartin, merchant.

Class 18.—*Carpets, Tapestry, and Furniture Tissues.*—M. Badin, Director of the Gobelins, &c.; M. Carlhian, merchant.

Class 19.—*Paper-hangings.*—M. Ciceri, decorative artist; M. Délicourt, formerly manufacturer.

Class 20.—*Cutlery.*—General Guiod; M. Dubocq, mining engineer.

Class 21.—*Goldsmiths' Work.*—M. le Duc de Cambacérès; M. P. Christofle, goldsmith.

Class 22.—*Bronzes and other Artistic Works, cast and chased.*—M. le Baron de Buteuval, senator; M. Barbedienne, manufacturer.

Class 23.—*Clock and Watch Making.*—M. Langier, Member of the Institute; M. Bréguet, manufacturer.

Class 24.—*Apparatus for Lighting and Heating.*—M. Clerget; M. Camus, of the Gas Company of Paris.

Class 25.—*Perfumery.*—M. Barreswill, Member of the Consultative Committee of Arts and Manufactures; M. Aubrey-Lecomte, Conservator of the Colonial Museum.

Class 26.—*Articles in Morocco, Tabletterie, and Basket-work.*—M. Wolowski, Member of the Institute: M. Louis Aucoc, manufacturer.

Class 27.—*Cottons and Cotton Thread.*—M. Gustave Roy, merchant; M. Fouquet-Lemaitre, manufacturer; M. Soyer, manufacturer.

Class 28.—*Linens and Yarns.*—M. Varin, merchant; M. Legentil, fils, merchant; M. Casse, manufacturer.

Class 29.—*Woollens and Yarns, combed.*—M. Larbonnier, manufacturer; M. Seydoux, manufacturer; M. Delatre, sen., manufacturer; M. De Brunet, of Rheims, manufacturer.

Class 30.—*Woollens and Yarns, carded.*—M. De Montagnac, manufacturer; M. Gillaume Petit, manufacturer; M. Vauquelin, manufacturer.

Class 31.—*Silk Tissues and Yarns.*—M. Payen, merchant; M. Jules Baimbert, merchant; M. Girodon, of Lyons.

Class 32.—*Shawls.*—M. Germain Thibaut, formerly manufacturer; M. Gaussen, formerly manufacturer.

Class 33.—*Lace, Embroidery, and Trimmings.*—M. Louvet, manufacturer; M. Lieven-Delhaye, formerly manufacturer.

Class 34.—*Hosiery, Linen, and Small Articles of Dress.*—M. Tailboins, manufacturer; M. Duvelleroy, manufacturer; M. Carcenac, formerly merchant.

Class 35.—*Clothing.*—M. A. Dusautoy, merchant; M. Ch. Petit, manufacturer; M. Latour, manufacturer; M. Laville, manufacturer; M. Balsan-Martin, manufacturer.

Class 36.—*Jewellery and Trinkets.*—M. Fossin, formerly Judge of the Tribunal of Commerce; M. Beaugrand, jeweller.

Class 37.—*Portable Arms.*—Colonel the Baron Treuille de Beaulieu, Director of the Artillery trying-house; M. A. Fouquier.

Class 38.—*Articles for Travelling and Camp Use.*—M. Alexis Godillot, manufacturer; M. Feston, of the Ministry of War, &c.

Class 38.—*Bimbeloterie (small wares).*—M. Jules Delbruck, author of technical works; M. Trélon, formerly manufacturer.

Class 40.—*Mining and Metallurgy.*—M. De Billy, Inspector-General of Mines; M. Goldenberg, manufacturer; M. Rivot, mining engineer.

Class 41.—*Forest Products.*—Marquis De Vibraye; M. Des Meloize, Keeper of the forest of Bourges.

Class 42.—*Products of the Chase, &c.*—M. Duchartre, Member of the Institute; M. Servant, merchant.

Class 43.—*Agricultural Products (not alimentary) of Easy Preservation.*—M. Lestiboudois; M. Moll, professor; M. Victor Borie, journalist.

Class 44.—*Chemical and Pharmaceutical Products.*—M. Balard, Member of the Institute; M. Sainte Clair-Deville, Member of the Institute; M. Daguin, Judge of the Tribunal of Commerce.

Class 45.—*Bleaching, Dyeing, Calico, &c., Printing.*—M. Persoz, professor; M. Bontarel, dyer.

Class 46.—*Leather and Skins.*—M. Faulen, formerly manufacturer; M. Ricord, merchant.

Instruments and Processes.

Class 47.—*Mining and Metallurgy.*—M. Callon, mining engineer; M. Salmon, merchant; M. Lan, mining engineer.

Class 48.—*Rural and Forest Culture.*—General Allard; M. Boitel, Inspector-General of Agriculture; Hervé Mangon, engineer-professor.

Class 49.—*Hunting, Fishing, &c.*—M. Coste, Member of the Institute; M. Coumes, Inspector-General of bridges and roads.

Class 50.—*Rural Factories and Alimentary Industries.*—M. Boussingault, Member of the Institute; Lælliet, director of the Agricultural School of the Saulsaie; Comte de Pourtalès.

Class 51.—*Chemical Arts, Pharmacy, and Tanning.*—M. Pelouse, Member of the Institute; M. Frémy, ditto; Dr. Grandeau.

Class 52.—*Prime Movers, Boilers, and Apparatus used for the purposes of the Exhibition.*—M. Gonin, engineer; M. Jacmin, engineer-professor; M. Mantion, engineer-professor.

Class 53.—*Machinery and Apparatus in general.*—M. Combes, Member of the Institute; M. Tourneyron, civil engineer; M. Luuyt, engineer of mines.

Class 54.—*Machine Tools.*—M. le Baron Renouard de Bussière, Director of the Mint; General Morin, Member of the Institute; M. Tresca, of the Conservatoire des Arts-et-Metiers.

Class 55.—*Machinery for Spinning and Twisting.*—M. Alcan, professor; M. Mercier, mechanician.

Class 56.—*Weaving Machinery.*—M. Schlumberger, mechanician; Villeminot-Hurard, manufacturer, Rheims; H. Scrive, manufacturer.

Class 57.—*Machinery and Processes of Sewing and making Garments.*—M. le Baron Seguier, Member of the Institute; M. Haas, manufacturer.

Class 58.—*Materials and Processes of Furniture Making.*—M. Bourniceau, engineer; M. Renard, contractor.

Class 59.—*Materials and Processes of Paper-making, Dyeing, and Printing.*—M. C. Laboulaye, formerly manufacturer; F. Normand, mechanician; A. Doumerc, director of paper manufactories.

Class 60.—*Miscellaneous Machines, Instruments, and Processes.*—M. Leblanc; M. Callon, civil engineer.

Class 61.—*Coach-building and Cart-making.*—M. Binder, late Judge of Tribunal of Commerce; Lavollée, director of Omnibus Company.

Class 62.—*Saddle and Harness Making.*—The Prince de Beavau; M. Moisette, director of omnibus works.

Class 63.—*Railway Material.*—M. Gayant, Inspector-General of Roads and Bridges; M. E. Flachat, consulting engineer of the W. and S. railways of France; M. Couche, engineer of mines.

Class 64.—*Telegraphic Apparatus and Processes.*—The Vicomte de Nougy, Director-General of Telegraphs; M. E. Becquerel, Member of the Institute.

Class 65.—*Civil Engineering, Architecture, and Public Works.*—M. Reynaud, Inspector-General of Roads and Bridges, professor; M. Viollet le Duc, architect; M. Delesse, engineer of mines; M. le Baron Baude, engineer of roads and bridges, professor.

Class 66.—*Material of Navigation and the Saving of Life.*—M. de Freminville, of the school of Marine Artillery; M. Le Normand, shipbuilder, Havre; M. Dumoustier, of the Ministry of Public Works.

Food, Fresh or Preserved.

Class 67.—*Cereals and Farinaceous Substances.*—M. Darblay, miller; M. Porlier, of the Ministry of Agriculture.

Class 68.—*Bread and Pastry.*—M. Husson, Member of the Institute; M. Foubert, of the Ministry of Agriculture.

Class 69.—*Oil and Fatty Substances, Milk, Eggs.*—Dr. Wurtz, Dean of the Faculty of Medicine; Dr. Poggiale, Inspector General of Military Pharmacy.

Class 70.—*Meat and Fish.*—M. Payen, Member of the Institute; M. Legendre.

Class 71.—*Vegetables and Fruits.*—M. Mercier, manufacturer; M. Pépin, of the Jardin des Plantes.

Class 72.—*Condiments and Stimulants; Sugar and Confectionary.*—M. Ménier, manufacturer; M. Jacquin, jun., manufacturer.

Class 73.—*Fermented Liqueurs.*—M. Pasteur, Member of the Institute.

Class 74.—*Reclamation of Lands and Agricultural Factories.*—The Marquis d'Havrincourt; M. Tisserand, of the Imperial agricultural establishments.

Class 75.—*Horses, Asses, Mules, &c.*—M. Rouy, of the Imperial Harras; M. Simons, agriculturist.

Class 76.—*Bullocks, Buffalos, &c.*—M. de Saint Leger, agriculturist; Dr. Henry Bouley, Inspector-General of Veterinary Schools.

Class 77.—*Sheep, Goats, &c.*—The Comte de Bouillé, agriculturist; Dr. Magne, Director of Veterinary School.

Class 78.—*Pigs, Rabbits, &c.*—M. Bella, Director of Agricultural School; M. Raynal, Professor, Veterinary School.

Class 79.—*Poultry.*—Comte L. Le Hon; M. Florent Prévost, of the Jardin des Plantes.

Class 80.—*Dogs.*—Comte Leconteulx de Canteleu; M. Pierre Pichot.

Class 81.—*Useful Insects.*—M. De Quatrefages, Member of the Institute; M. Blanchard, Member of Institute.

Class 82.—*Fish, Crustacea, &c.*—Captain Champeaux, Imperial Navy; M. Gerbe, College of France.

Class 83.—*Glass-houses and Horticultural Material.*—M. Darcel, engineer of roads and bridges; M. Hardy, garden of Versailles.

Class 84.—*Ornamental Plants and Flowers.*—M. A. Brongniart, Member of the Institute; M. Lucy, Vice-President of Paris Society of Horticulture.

Class 85.—*Kitchen Gardening.*—M. A. Rivière, Luxembourg garden; M. Courtois-Gérard, merchant.

Class 86.—*Fruit and Fruit Trees.*—M. Decaisne, Member of the Institute, professor; Dr. Guyot, vine-cultivator.

Class 87.—*Seeds and Plants of Forest Trees.*—M. Moreau, Judge of the Tribunal of Commerce; M. De Gayffier, Sub-Inspector of Forests.

Class 88.—*Hot-house Plants.*—Dr. Chattin, Hôtel Dieu; M. Barillier Déschamp, gardener of City of Paris.

Economic Group.

Class 89.—*Instruction of Children.*—M. Flindin, Councillor of State; M. Léon Plée; M. Marguerin, Ecole Murgot; M. Laurent de Billé.

Class 90.—*Adult Education and Libraries.*—M. C. Robert, Councillor of State; M. Pompée, School of Jory; M. Demarquay, Surgeon; M. De Mofras, Secretary of Embassy; M. Sebastian Cornu, painter.

Class 91.—*Furniture, Clothing, and Food.*—M. Vuillefroy, Senateur; A. Cochin, Member of the Institute; M. V. Darroux, service of military clothing; M. Moréno-Henriques, Douane; M. Bouffard, merchant; M. Ducuing, economist; M. Jourdain, formerly manufacturer; M. Aimé Sellières, manufacturer.

Class 92.—*National Costumes.*—M. Armand Dumaresq, painter; M. Ernest Dréolle, writer.

Class 93.—*Sanitary Habitations.*—M. Conti, Chef du Cabinet of the Emperor; M. Degrand, engineer of roads, &c.

Class 94.—*Productions of Working Masters.*—M. Mathieu, deputy; M. Auguste Vitu, writer; M. Saint-Yoes, engineer of roads, &c.

Class 95.—*Tools and Processes of Working Masters.*—M. Darimont, deputy; M. Van Blarenberghe, engineer of roads, &c.; M. Grohè, manufacturer.

According to an Imperial decree, the appointment of the jurors for the group of the Fine Arts is postponed until the juries of admission have finished their labours.

The election of the latter body has just taken place, two-thirds having been chosen by the body of decorated artists, and one-third by the administration. This election created considerable interest, and the result is such as fully to warrant the experiment. The following are the names of the artists elected:—

In the section of Painting and Drawing (number of votes, 147.)—MM. Pils, Cabanel, Gérome, Ingres, Bida, Hébert, Fromentin, Breton (Jules), Baudry, Meissonier, Gleyre, Théodore Rousseau, Français, Brion, Jalabert, Couture.

In Sculpture, (70 votes)—MM. Guillaume, Barye, Cavelier, Dumont, Bonnassieux, Thomas, Soitoux, Jouffroy, Perraud, Cabet.

In Architecture (33 votes)—MM. Duc. (J.L.) Garnier, Duban, Ballu, Vaudoyer, Henri Labrouste.

In Engraving and Lithography (25 votes)—MM. Henriquel-Dupont, Achille Martinet, Alphonse, Francois, Mouilleron, Charles Jacque, Gaucherel.

To those have been added by the Imperial Commission:—

Section of Painting and Drawing—MM. Cottier, J. Halphen, Lacaze, Charles Leroux, le Marquis Maison, Frederic Reiset, Paul de Saint-Victor, le Comte Welles de la Valette.

Section of Sculpture—MM. Charles Blanc, de Longpérier, Michaux, Soulié, Théophile Gautier.

Section of Architecture—MM. de Caumont, le Baron de Guilhermy, Albert Lenoir.

Section of Engraving and Lithography—MM. Ad. de Beaumont, le Vicomte H. Delaborde, Marcille.

Fine Arts.

Royal Academy.—The President, according to annual custom, distributed, on Monday evening last, the medals won by the pupils. Prizes were awarded to drawing, painting, and modelling from the life, copy painting from ancient masters, drawing and model from the antique, restoration of the Theseus, drawing in perspective, &c. The President expressed the desire of the Academy to promote the study of architecture, and at the same time the regret and astonishment they had felt that the prize offered to architectural pupils had not for three years obtained a competitor. He hoped in the coming year for a more encouraging result. Sir Francis Grant then delivered to the students the first discourse since his election as president. He commenced by paying a fitting tribute to the erudition, judgment, and gentlemanly bearing of his predecessor, Sir Charles Eastlake, whose loss was especially felt on those occasions. He then dwelt on the advantages to be derived from intellectual culture and general accomplishments, which would not fail to be reflected in corresponding refinement in the painters' works. He in like manner urged the students to cultivate high tone of mind and gentlemanly feeling, as sureties of success in after-life. He also spoke against the practice of Sunday work. God's blessing could not be expected when His laws were broken; and even on lower grounds jaded powers required a day of rest. The president further observed that students now possessed greater advantages than in former times, therefore more would be expected of them. Not only within the walls of the academy existed better means of study, but likewise the accumulated works by the old masters in the National Gallery secured to young artists great benefits. Sir Francis Grant earnestly recommended the study of Raphael, Titian, Correggio, Claude, &c., among the old masters, and Reynolds and Turner in our own sch ool. By such

appeal to historic works the mere passing fashion of the day might receive correction. He did not deem Pre-Raphaelite painters, however admirable for colour and devotional expression, fit subjects for imitation. The president then continued that there was for all of them one special cause for congratulation. They knew that notice had been received to quit the premises in which they were now assembled; but they had obtained another site equally good, where they would be able to provide exhibition rooms double in extent of the present. It was not intended that the academy should in consequence receive an inferior class of works. The high quality of the exhibition would be maintained, yet he hoped that every picture accepted on its merits might obtain a place. He could assure his hearers that the inevitable rejection of so many good pictures had occasioned the Academy sincere sorrow. It was the students who would chiefly reap the advantages to be secured by the new building. In conclusion, Sir Francis Grant assured all present that he should be happy on every occasion to assist students in the prosecution of their labours. They might come to him as President, without introduction. It may be interesting to know that on the 11th December, 1769, ninety-seven years previously, almost to the very day, Sir Joshua Reynolds, the first President of the Academy, made the first distribution of prizes to its students. He then delivered the second of those discourses, which are now text-books to artists.

Royal Archæological Institute. — Mr. George Scharf has given, at a meeting of the Archæological Institute, an account of the proceedings lately taken for the restoration of the ancient portrait of King Richard II. This portrait, which used to hang in Westminster Abbey, above the Lord Chancellor's pew, was, when recently exhibited in South Kensington, accepted as among the very few authentic works of the fourteenth century. The original picture had been, however, in great measure hidden by successive coats of paint put on by restorers. These have now been removed by Mr. H. Merritt, under the supervision of Mr. George Richmond. The portrait of Richard II., as now revealed, may, it is believed, have been painted from the life.

Manufactures.

Ship-building in California.—For many years towns such as San Francisco have had recourse to importation in order to obtain their necessary wants. General industry develops itself but slowly in these colonies, peopled from causes such as the discovery of diggings or gold mines. It results from this an increase in the price of land, labour, and provisions, that checks certain enterprizes that may be easily replaced by importation. Ship-building, for instance, requires such special conditions, that in places where these conditions are not united, it is not attempted, and it is preferred to order the ships from foreign countries. Formerly the ship-building at San Francisco was limited to the construction of boats, or some decked vessels of insignificant tonnage, intended for coasting trade. At the present time several vessels are built at San Francisco of a size that an older port might be proud of. The Californian ships are usually built of the oak of the country; however, there is on the stocks a schooner; the keel, the kelson, and ribs are of teak, and the deck planking is to be constructed of the same material. The teak is a wood the hardest which is known for ship-building purposes. That wood, at San Francisco, is imported from Batavia. This wood is not more expensive than Californian oak, or imported oak timber. The principal drawback in California to the development of ship-building, is not the want of good shipwrights so much as the high price of labour and the scarcity of timber of first-rate quality in the market. But time will overcome these obstacles, hand labour becomes each day cheaper, and the forests on the borders of the Pacific are only beginning to be worked. When the country is better provided with roads and railways, ship-building will develop itself.

Commerce.

Cuban Exports.—In September, the Spanish Government abolished export duties in the island of Cuba, and, on the very first day the measure came into operation, 15,000 cases of sugar were declared for export, the daily average having never before exceeded 300; and 374,000 cigars were also declared, in place of the average of 28,000.

Wool Imports.—The total imports of sheep's wool into the leading ports of the kingdom in October were 82,835 bales, and of goats' wool 3,921 bales. Of the sheep's wool 43,371 bales came to London, 28,517 to Liverpool, 7,830 to Hull, and 3,117 to Leith. The colonial wool received was 7,301 bales, from the Cape and Natal 25,961, and from the East Indies 12,197 bales.

Production of Wool in the Argentine Republic.—In the province of Buenos Ayres the production of wool has obtained an immense development. The exportation of wool from Buenos Ayres in 1832 was only 944 bales. In 1840 it had increased to 3,677 bales; in 1850 to 17,069 bales; in 1860 to 60,872 bales; and finally in 1864 to upwards of 115,000 bales, the quality of which is not surpassed by that of Australia, which represents a value of £2,200,000 sterling. For the last sixteen years the quality of the wools has been considerably improved by the introduction of certain breeds, especially those of Rambouillet and of Saxony. It is now estimated that the province of Buenos Ayres alone supports not less than 30 millions of sheep.

Colonies.

South Australian Statistics.—It appears from the government returns made up at the end of June, 1866, that purchased land is held by the colonists to the extent of 80 acres to every member of the community, or an increase of two acres on the year previous, and that of this land the proportion cultivated is 16½ acres to every person. As to the amount of taxation paid through the Customs, it is shown that in this colony the rate is 30s. per head, in New South Wales 40s. per head, in Victoria 32s. per head, in Queensland 76s. per head. Then in the matter of the bonded debts the comparison is still more striking:—

	Population.	Debt.	Per Head.
New South Wales..	421,000	£5,638,530 or	£13 8
Victoria	632,998	8,733,445 „	13 16
Queensland	95,100	3,021,186 „	31 15
South Australia....	165,934	751,600 „	4 10

These figures tend to show that if ever there was a colony that ought to progress South Australia is one, its burdens being light, and its not being taxed a seventh of the extent of the colony of Queensland. The estimated revenue from the Customs for the year 1867 is £255,000, against £244,261 for the year ended June, 1866, but this increase depends upon next harvest. The revenue from land sales is put down at the reduced amount of £220,000, which the treasurer thinks sufficient, considering that the purchasing power of the community is already small, and that it is the policy of government not to press sales unduly. The amount proposed to be spent in immigration is £25,000, and the total provision made in the estimates for public works is £170,370; but this is inclusive of £147,000 for road purposes, which the government intend to borrow from the immigration fund through the issue of bonds under the Bond Act of 1864.

Agricultural Societies in Victoria.—There are 32 agricultural societies and farmers' clubs throughout Victoria, and their revenue for 1865 was £7,069 18s. 1d., which was supplemented by grants out of the vote of the Government to the Board of Agriculture to the amount of £4,000, in a certain proportion to the amount locally received. The £6,500 which the Board has to spend in the current year is allocated as follows:—In aid of agricultural societies, £4,500; premiums, experiments, contingencies, and for national shows, £1,285; expenses of the Board and Council, £175. It may be mentioned that certain national shows, in which the neighbouring colonies compete, are managed by the Board, either alone or in co-operation with the local society in whose district the show is held. The Board also endeavours to be of use in encouraging experimental farming. As showing what the Board of Agriculture and the local societies do among them for the promotion of agriculture by means of competitive examinations, it may be stated that, in the year 1865–66, £5,748 15s. 6d. was given in premiums at shows managed by the societies. The exhibits comprised horses and cattle, sheep and wool, swine, poultry, and dairy produce, implements and machinery, agricultural, vineyard, and orchard produce.

Obituary.

M. Vidi, the inventor of the aneroid barometer, died some months since at Paris. The following particulars of his life have been kindly furnished by Mr. W. A. Gilbee:—"Having had an acquaintance with M. Vidi (in connection with my late uncle and partner, his friend and agent), for about 25 years, I beg, in the absence of a more able narrator, to offer some particulars relating to this remarkable and celebrated inventor, in relation with his simple and efficient instrument, thinking they might perhaps be of interest to the readers of your *Journal*. Although his first English patent for the aneroid barometer is dated the 27th April, 1844, M. Vidi's name was scarcely known until recently, his desire for public *éclat* being as small as his indomitable will and perseverance were great. The reward he sought was the consciousness of having aided scientific researches, by adding to the meteorological instruments of his day. Still, like many inventors, his fortune was far from being made, and, but for his agent, the bringing out of his invention might have been much longer delayed. M. Vidi was a native of Nantes, in France, and was educated for the bar, but turned his attention to mechanical pursuits, and by dint of many years of strenuous and unremitting exertions, and after repeated failures, he succeeded, the instrument which he called the aneroid barometer being the fruit of his labours, the word "aneroid" signifying without liquid, in contradistinction to the ordinary mercurial or other liquid barometer. Subsequently, improvements were made and patented by M. Vidi in the registering mechanism of his instrument, but without affecting the principle, which remains the same, and is too well known to require description. M. Vidi's rights to the principle of the invention were encroached upon in France, giving rise to lengthened and expensive litigation, which, however, terminated in the acknowledgment of M. Vidi's right to it, by the highest tribunal. Before the expiration of his patent, M. Vidi had realized what was supposed to be a large fortune (too large for counsel to advise an application for an extension of his patent in England), and he sought relief and recreation in travelling to the chief capitals of Europe, his journeys being performed in the most rapid manner that modern improvements would allow, and with total disregard to the wear and tear of his own frame. I am informed that in one of these rapid excursions the seeds of a disease were sown which brought his life to a close."

Publications Issued.

Lessons in Elementary Physiology By Thomas Huxley, LL.D., F.R.S. (*Macmillan.*)—This work is primarily intended to serve the purposes of a text-book for teachers and learners in boys' and girls' schools. The object has been to set down in plain and concise language that which any person who desires to become acquainted with the principles of human physiology, may learn with a fair prospect of having but little to unlearn as his or her knowledge widens.

Notes.

Music.—It is said that Dr. Wylde has purchased the German Bazaar in Langham-place, with the view of building a music-school there, and, in connexion with it, a concert-room and a theatre.

Storm Warnings and Weather Reports.—The Board of Trade has issued the following circular, dated the 29th of November:—"The Board of Trade have had under consideration the report of a committee appointed by the Royal Society, the Admiralty, and the Board of Trade, to inquire into the constitution and functions of the Meteorological Department, which recommended, as the most important step to be taken, the transfer of the management of the business of the department to a scientific body. The Board of Trade have also consulted the Royal Society upon the subject of this report, and the President and Council of the Royal Society concur generally in the measures recommended by the committee, and are prepared to undertake the duty proposed to them. With regard to the issue of storm warnings, the President and Council of the Royal Society are of opinion that 'at present these warnings are founded on rules mainly empirical,' and therefore should not be issued under the superintendence of the scientific body to whom the discussion of meteorological observations will be committed. The President and Council think, however, that 'in a few years they may probably be much improved by deductions from the observations in land meteorology, which will by that time have been collected and studied; and that the empirical character may thus be expected to give way to one more strictly scientific, in which case the management of storm warnings might be fitly undertaken by a strictly scientific body.' Under these circumstances the Board of Trade are compelled to suspend, from the 7th of December next, 'cautionary storm-warnings,' which have from time to time been issued by the Meteorological Department of the Board of Trade. It is hoped that the warnings may be resumed by the new Meteorological Department at no distant time upon an improved basis. In the meantime the daily 'Weather Reports' will be received and published as heretofore. If at any port or place there is a desire to have these reports, or any part of them, communicated by telegraph on the morning on which they are received, they shall be so communicated, on a request to that effect being sent to the Board of Trade, accompanied by an undertaking to pay the expense of the telegram from London to the port or place. —T. H. Farrer."

Correspondence.

Trade in Foreign Cattle.—Sir,—In the *Standard* of Thursday, December 6th, I find a notice of a paper read by Mr. John Irwin at the Society of Arts. Mr. Irwin has committed an error in his calculation, stating the number of cattle in Belgium to stand at about $3\frac{5}{8}$ (cattle) to 1 (population); and this is of great importance to the question at issue, which must serve as

my apology for addressing you. Mr. Irwin mentions specially the latest statistics. Now, the latest census in Belgium was in 1862 (31st Dec.) and the population according to this was 4,836,566 souls; consequently if there were nearly $3\frac{5}{8}$ head of cattle for each soul, the total amount of cattle would be nearly 17,532,551 head, which would be very surprising, because it differs so amazingly from the result of the census of 1839-40, 1846-47, and 1856, which I here transcribe:—

	Souls.		Head.
Population 1839 ..	3,992,241	Cattle 1830 ..	912,740
„ 1847 ..	4,337,195	„ 1846 ..	1,203,891
„ 1856 ..	4,529,560	„ 1856 ..	1,257,649
„ 1862 ..	4,836,566	„ 1862 ..	. . .

Not having myself the cattle census for 1862, I leave a blank; probably, according to Mr. Irwin's statistical sources of information, this should be filled up with 1,334,225 head, which would show the progressive increase to be steady and regular, for it is quite impossible that there could have been an increase from 1,257,649 head in 1856 to 17,532,551 head in 1863. The proportion should therefore stand for Belgium at nearly $3\frac{5}{8}$ souls to 1 head of cattle, or about 0·275 (less than $\frac{1}{3}$) head of cattle for each soul, placing it between Sweden and Holstein, instead of at the head of the list. In further proof of this we have only to look to the table of exports and imports. In 1854 Belgium imported 35,642 head of cattle, and exported 52,709; excess of exports, 17,065. In 1862 Belgium imported 64,882 head of cattle, and exported 59,318; excess of imports, 5,564. Mr. Irwin's mistake was evidently the result of a clerical error, the division having been effected the wrong way. Will you kindly communicate the contents of this note to Mr. Irwin, and beg of him to have the kindness to let me know the name of the book or paper from which he took his statistical data, which seem otherwise very correct, as I am engaged on a paper for one of our magazines, and would be glad to have access to such important material.—I am &c., F. Dwyer, Major, Austrian Army. P.S.—If Mr. Irwin wishes to know the average quantity of meat per head consumed in some of the continental countries and armies, I can give it to him.

51, Cauldwell-street, Bedford, December 10th, 1866.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...British Architects, 8.
Actuaries, 7. 1. Mr. Meikle, "Mortality Experience Data." 2. Mr. Sprague, "On the Limitation of Risks." Part II.
R. Asiatic, 3.
Victoria Inst., 8.
Society of Engineers, 7. Prof. Tennant, "On Granite, as a material for constructing Embankments, Bridges, etc."

Tues. ...Civil Engineers, 8. Annual General Meeting.
Statistical, 8. Mr. Jacob Waley, "On Combinations and Strikes, with reference to the Rate of Wages."
Pathological, 8.
Ethnological, 8.
Anthropological, 8.

Wed ...Society of Arts, 8. Mr. James Fergusson, "On the Study of Indian Architecture."
Geological, 8. 1. Prof. Huxley, "On a new specimen of *Telerpeton Elginense*. 2. Mr. S. V. Wood, Jun., "On a section at Litcham, affording evidence of glaciation." 3. Mr. F. W. Harmer, "On the existence of a Third Boulder Clay in Norfolk." Communicated by Mr. S. V. Wood, Jun.
London Inst., $6\frac{1}{2}$.
R. Society of Literature, $8\frac{1}{2}$.

Thur .. Royal, $8\frac{1}{2}$.
Antiquaries, $8\frac{1}{2}$.
Linnæan, 8. 1. Dr. Masters, "On the Morphology of the *Malvaceæ* and allied orders." 2. Mr. Woolls, "On introduced Plants occurring in the neighbourhood of Sydney."
Zoological, $8\frac{1}{2}$.
Chemical, 8. 1. Mr. Perkin, "Basicity of Tartaric Acid." 2. Mr. J. Hunter, "Absorption of vapours by Charcoal." 3. Mr. E. T. Chapman, "Reactions of Hydroiodic Acid."
Philosophical Club, 6.

Fri .....Philological, 8.

Patents.

From Commissioners of Patents' Journal, December 7th.

Grants of Provisional Protection.

Automaton figures—2897—J. S. Cavell.
Bituminous substances, extracting oil from—3106—W. E. Newton.
Carding engines—2933—W. Robertson and C. J. Waddell.
Carriages—3108—G. H. and E. Morgan.
Carriages, raising the heads of—3100—W. Botwood.
Chains—2943—J. H. Johnson.
Chimney tops—2249—J. Denley.
Chimney tops—2965—G. Whitehead.
Coke—2909—G. Shaw.
Cooking ranges—2917—E. K. Heaps.
Couplings—2921—J. H. Johnson.
Digitorium—3076—M. Marks.
Fibrous materials, doubling—2941—R. Lakin and J. Wain.
Fibrous substances, preparing—3102—J. Buckley.
Fire arms and cartridges—2855—J. Lewis.
Fuel, economizing—3082—J. Robinson.
Furnaces—2907—J. J. Bagshawe.
Greasing apparatus—2929—H. A. Bonneville.
Hydraulic cements—3086—J. J. and T. H. Coleman.
Iron, extracting—2947—G. Crawshay and J. Thomas.
Iron, extracting—2957—G. Crawshay and J. Thomas.
Jewellery—2951—G. Perry.
Leather—3114—W. Clark.
Inks—3078—I. Riley.
Looms—2905—T. Kershaw.
Loom sheds, driving the shafting of—3096—W. B. Johnson.
Lubricants, testing—2953—J. Ingram and H. Stapfer.
Messages, transmitting—3094—R. B. Jones.
Metallic products, utilizing waste—2825—J. H. Shorthouse and J. Fergusson.
Metals, rolling—2895—P. Kirk.
Optical illusions—3110—W. H. Harrison.
Persons, &c., raising and lowering—3088—F. R. A. Glover.
Pianofortes—2963—T. Molineux.
Picks—2973—F. W. Dahne and D. Thomas.
Pipes—2983—T. S. Truss.
Pocket knives—2923—W. E. Newton.
Railway signals—3092—H. M. Clements.
Railway wheels, securing the tires of—3080—W. W. Smith.
Reaping machines—2903—A. V. Newton.
Sashes, &c., forming joints between—2959—J. R. Cadman.
Straw, elevating—3084—J. Coulson.
Substances, evaporating the juices of—3104—W. E. Gedge.
Substances, preserving—3112—N. S. Shaler.
Surfaces, ornamenting—2937—G. Josse.
Tools, chucks for holding—2899—C. Churchill.
Tubes—2985—H. Hughes.
Tubes, conveying articles through—3090—C. W. Siemens.

Inventions with Complete Specifications Filed.

Coffee and tea, treating—3131—W. Pidding.
Mowing and reaping machines—3186—G. Haseltine.

Patents Sealed.

1588. D. Cochrane.	1798. W. Clark.
1589. A. Thornton.	1807. G. Davies.
1592. A. Parkes.	1835. W. E. Newton.
1593. S. Lees.	1936. G. B. Woodruff.
1594. T. J. Leigh.	2250. G. T. Bousfield.
1612. J. C. Cole.	2287. W. P. Bardell & W. Powell.
1623. W. Knaggs.	2325. E. Fitzhenry.
1636. G. H. M. Muntz.	2420. J. W. Morgan.
1717. W. E. Newton.	2502. J. H. Dallmeyer.
1793. C. Harvey.	

From Commissioners of Patents' Journal, December 11th.

Patents Sealed.

1595. G. Allix.	1633. W. B. Brown.
1596. P. H. Limet.	1644. F. B. Lucas.
1599. R. A. Wright.	1701. J. Milroy.
1601. G. D. Kittoe.	1748. W. J. Baker.
1607. J. A. Forrest.	1880 W. Clark.
1610. W. H. Hall and J. Cooke.	2041. W. Clark.
1616. J. Carter.	2054. W. Clark.
1620. R. E. Hodges.	2113. W. Tranter.
1621. J. Whitaker.	2187. W. E. Newton.
1628. B. F. Stevens.	2388. G. T. Bousfield.
1631. A. Lees and J. B. Slater.	2389. G. T. Bousfield.
1632. G. R. Wilson.	2673. A. V. Newton.

Patents on which the Stamp Duty of £50 has been Paid.

3057. W. Gorman and J. Paton.	3120. J. Bullough.
3166. J. Davidson.	3107. T. V. Morgan.
3171. J. Smith.	3182. J. B. Fell.
3231. W. L. and T. Winan.	3093. T. Harrison.
3066. W. and S. Firth, and J. Sturgeon.	3095. W. Mcl. Cranston.
	3109. M. Hillary.
3148. P. Ward.	3170. C. J. Robinson.
3210. F. Walton.	52. A. J. S. Graham.

Patents on which the Stamp Duty of £100 has been Paid.

2623. A. Godchaux.	2834. W. Hulse.
2758. C. Sells.	2792. W. Boaler.
2774. J. Combe.	2860. W. H. Harfield.

Journal of the Society of Arts.

FRIDAY, DECEMBER 21, 1866.

Announcements by the Council.

Notice to Members.

The large and interesting collection of photographs, illustrative of the Paper read by Mr. Fergusson, on Wednesday evening last, will remain in the Society's room (by Mr. Fergusson's courteous permission) for the inspection of members and their friends during the Christmas week.

Cantor Lectures.

The first course of Cantor Lectures for the present session will be "On Pottery and Porcelain," and will be delivered by William Chaffers, Esq. It will consist of six lectures, and will commence on Monday evening, the 21st January next, and be continued on succeeding Monday evenings.

The second course will be "On Music and Musical Instruments," to be delivered by John Hullah, Esq. Arrangements for a third course are in progress.

The lectures will commence each evening at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend to each lecture.

A new list of members of the Society has been printed, and any member can have a copy sent to him on application to the Secretary.

Food Committee.

The Council have passed the following resolution :—

"That a Committee be appointed to inquire and report respecting the Food of the People, especially, but not exclusively, the Working Classes of the people; and that, having regard to the publications of the Privy Council and other documents, which illustrate the defective amount of nutritious food available for the population at large, the said Committee do report respecting the resources which are, or might be rendered, available for the production, importation, and preservation of substances suitable for food, and for improving the methods of cooking in use among the Working Classes."

In accordance with this resolution, a Committee has been appointed, consisting of the following gentlemen, who have consented to serve :—

The Rt. Hon. H. A. Bruce, M.P., *Chairman of the Committee.*
The Right Hon. C. B. Adderley, M.P.
*E. Akroyd, M.P.
*John Bell.
*Professor Bentley.
*W. H. Bodkin, *Assistant Judge.*
*Harry Chester.
Hugh C. E. Childers, M.P.
Rev. W. L. Clay.
The Right Hon. W. F. Cowper, M.P.
*Lord De L'Isle & Dudley.
W. Ewart, M.P.
R. Culling Hanbury, M.P.
G. W. Hastings.
*William Hawes.
John T. Hibbert, M.P.
*Chandos Wren Hoskyns.
*Lord Henry G. Lennox, M.P.
W. H. Michael.
Lord Robt. Montagu, M.P.
W. Newmarch, F.R.S.
F. Parish.
*Sir Thomas Phillips, Q.C., *Chairman of the Council.*
F. S. Powell, M.P.
C. S. Read, M.P.
G. Sclater-Booth, M.P.
The Earl of Shaftesbury.
*Benjamin Shaw.
*Sir James Kay Shuttleworth, Bart.
W. T. McCullagh Torrens, M.P.
*Thomas Twining.
James Ware.
Edward Wilson.
*G. F. Wilson, F.R.S.
Rev. C. Wright.

The first meeting of the Committee takes place this day.

Institutions.

The following Institution has been received into Union since the last announcement :—

Werneth (Oldham) Mechanics' Institution.

Art-Workmanship Prizes.

The Worshipful Company of Clothworkers have contributed the sum of ten guineas to the Art-Workmanship Prize Fund.

Proceedings of the Society.

Fifth Ordinary Meeting.

Wednesday, December 19th, 1866; Sir James Fergusson, Bart., M.P., Under-Secretary of State for India, in the chair.

The following candidates were proposed for election as members of the Society :—

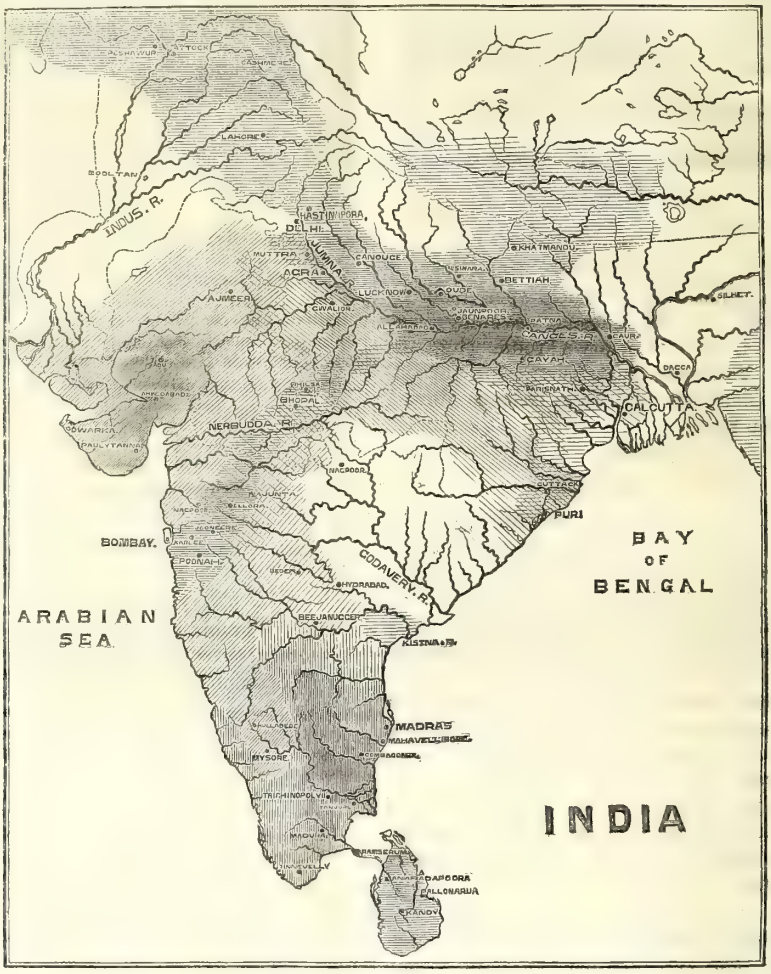
Bevan, Phillips, Albert-terrace, Windsor.
Davis, Sir John Francis, Bart., K.C.B., Athenæum Club, S.W., and Hollywood, Henbury, Bristol.
Leeke, Henry J., 5, Clarence-terrace, Leamington.
Lewis, Evan, Aberdare.
Phillips, Thomas Henry, 51, Lime-street, E.C.
Pitter, Joseph, 2, Thanet-place, Strand, W.C.
Railton, George W., Alderley-edge, Manchester.
Roberts, Howland, Neilgherry-house, Hampstead, N.W.

The following candidates were balloted for, and duly elected members of the Society :—

Bentley, James, Woodgreen-park, Cheshunt.
Dyke, William Hart, M.P., Lullingstone Castle, Kent.
Nicholson, William Henry, St. Margaret's, Rochester.
Poole, William, Hentland, Ross, Herefordshire.
Rowley, James Campbell, 2, Clarence-buildings, Booth-street, Manchester.
Russell, C., Stubbers, Romford.
Wainwright, James Gadesden, Clapham-common, S.
Williams, John Carvell, Everdon-house, Surbiton, S.W.

The Paper read was—

* Those marked thus are Vice-Presidents or Members of the Council of the Society of Arts.



SKETCH MAP OF INDIA,

Showing the approximate Distribution of the four principal Styles of Hindu Architecture, viz.:—

Buddhist, distinguished by horizontal hatching .....

Dravidian, by perpendicular lines .....

Northern Hindu, by lines sloping to the right.....

Chalukya and Jaina, by lines sloping to the left .....

ON THE STUDY OF INDIAN ARCHITECTURE.

By James Fergusson, Esq., F.R.S.

At the request of several members of this Society I have undertaken a task which I commence with the unpleasing conviction that it is impossible I should succeed in its performance. When the proposition was first made to me, it was that I should give three or four Cantor Lectures, in which I was expected to make clear all the intricacies of Indian architecture. This I flatly refused to undertake, feeling the utter hopelessness of the task. Had I been asked to explain in four lectures all the peculiarities of Egyptian, Greek, Roman, and Gothic art, I might have ventured, for I could then have calculated on my audience understanding me when I spoke of temples and of churches, or defined the classical orders, or described pointed arches, window tracery, or spoke of aisles, or pinnacles and steeples, or such like objects. The case, however, would be widely different in India. How many in a mixed audience might I calculate upon on as able to appreciate the difference between Buddhist and Jaina architecture, or between that of the Dravidian and Bengalee ?—or who would know what I meant when I spoke of dagopas, vimanas, mantupas, or similar parts of a building ? Without some previous local knowledge on the part of my audience, I felt that the task could not be accomplished in four or forty lectures, and even then with an amount of definition and illustration which is now impossible to contemplate.

The attempt being therefore abandoned, all I propose this evening is to try and point out to you the importance of the study of Indian art, and some of the means by which a knowledge of it may be obtained.

I need hardly add that if I am to treat so vast a subin the short space of one hour, I must deal largely in dogmatic assertion, and you must take a great deal of what I say on trust, as it will be impossible to stop and explain my reasons on every point, but I trust that the photographs I have placed on these walls will suffice to bear me out on such points, and to convince you that I have at least some good grounds to go upon.

If, however, I am to end in being dogmatical, I must begin by being egotistical; and I hope you will excuse me in this, as it is not for the sake of speaking of myself, but because it appears to me that the shortest and simplest mode of explaining the present position of the subject is by recounting my own experience in regard to it.

When I was in India, between twenty and thirty years ago, the subject of Indian architecture had hardly been touched. Views of Indian buildings had, it is true, been published by Daniell and others, but no attempt had been made to classify them, and the vaguest possible ideas prevailed as to their age or relative antiquity. At that time, thanks to the learning and enthusiasm of Mr. James Prinsep, great progess was being made in the decipherment of Indian inscriptions, and the study of the antiquities of the country, and I determined to try if the architecture could not be brought within the domain of science. For several years I pursued the study almost unremittingly, and bit by bit the mystery unravelled itself. I learnt that there was not only one Hindu and one Mahomedan style in India, but several of each class; that these occupied well-defined local provinces, and belonged each to ascertained ethnological divisions of the people; and I also found out, much to my disappointment, that the presumed antiquity of the rock cut examples was a myth; and that the whole could be arranged into consecutive series, with well-defined boundaries.

When I returned to this country I commenced the publication of the results of my investigations, but the public were not then prepared for such works, and, like most authors in a similar predicament, I tired of publishing expensive books which nobody bought, or read, and which entailed a considerable pecuniary loss on their authors. There the matter might have rested had it not been that lately photography had come to aid us in our researches. Every day new series of photographs are coming home from India. Almost all the best known buildings have been taken—some very imperfectly, it must be confessed, but still sufficiently well to authenticate or correct previous illustrations, and anyone, at a small expense, may now make himself master of any branch of the subject. For myself, I may say that I have learnt as much if not more of Indian architecture during the last two or three years than I did during my residence in India, and I now see that the whole subject may be made intelligible, and I see how it can be done. The defect of what has been done hitherto is that it has been done without system, and that unless the investigator has such previous knowledge as I happened to obtain when in the East, it is difficult to learn where to begin, and the difficulty will, I fear, remain till some good handbook or grammar of the subject is published. I have attempted something of the sort in the volume of my history just published, but it is meagre and far too short. 300 pages and 200 wood-cuts will not suffice for so vast a subject, and something more must be done before the study of Indian architecture will be easy or popular.

Many may be inclined to ask—Is it worth my while to learn all the hard unpronounceable names which are indispensable to the knowledge of the subject, or to render myself so familiar with all its myriad forms as to be able to detect their affinities or differences ? What will there be to repay me for all this trouble ? The answer to these questions appears to me to be twofold, and it is what I wish to impress on you this evening. The subject I believe to be important, and worthy of study, first as regards our knowledge of India itself, and in the second place from its bearing on our own architectural development.

Taking India first. It is, of course, difficult for me to guess what information my present audience may have on this subject, but this I know, that, in general society, very few have clear ideas of who the inhabitants of India are or whence they came. With most people the Hindus, or, as they used to be called, the Gentoos, are one people, at least as uniform as the Germans or French, and worshipping certain gods, whom they have superstitiously reverenced from time immemorial. When you begin to look below the surface you find the case is widely different. In the first place, the valley of the Ganges was, at the very dawn of history, inhabited by races whom we now are forced to call aboriginal, as we know nothing of their origin, and we find detached fragments of them existing in the hills under the name of Bhils, Coles, Gonds, &c. Leaving them for a moment, we find there a people whom we call Aryans, who came into India across the Upper Indus, it may be about 2,000 years before Christ, or even earlier. They first settled in the Punjaub; then in the water shed, between the Sutlej and the Jumna; and, lastly, in Oude and further eastward. These were the Sanscrit-speaking races, to whom we owe all the important literary productions of India.

After a thousand years' sojourn in India they lost their purity of race, apparently by intermingling with the aboriginal races, and by the innate decay of enervation by the climate. This enabled a prophet called Sakya Muni, or now generally known as Buddha, to call upon the aboriginal races, and to convert the whole of Northern India to the religion known as Buddhism. It was not till 300 years after his death, which happened in 543, that this faith became the religion of the state. This happened in the reign of King Asoka, about 250 B.C., and for 1,000 years it continued the prevailing religion, though at the present hour there is not a native-born Buddhist in India, and but for the monuments we might almost be allowed to doubt its prevalence.

It is with this religion and this king that our architural history begins in India. Before his time we have nothing, and in the annexed illustration we have a proof



Facade of Cave in Behar (Temp. Asoka, b.c. 250).

that we ought not to expect to find anything. It is well-authenticated example of his reign, and though cut in the granite rock every form and every detail is copied from some wooden original, showing that at the time it was executed stone architecture was unknown in India, and men were only beginning to think of a more durable material. From that time we have hundreds of examples in which we see the wooden forms gradually dying out and being replaced by those more appropriate to stone; and at last, after following it for 1,000 years, we find it gradually fading into the style contemporaneously elaborated by the Jains and Hindus, and dying out with the religion that gave birth to it.

Leaving the valley of the Ganges, we find another great immigration taking place. This time it was that of the Dravidian tribes, and instead of Balkh and Bokhara, from which the Aryan tribes came, their seat was further south, and they crossed the Lower Indus into Guzerat, and before we became acquainted with them had got pressed down by subsequent immigration into the southern angle of the peninsula. They now occupy the whole, or nearly so, of the Madras Presidency, and are one of the greatest building races in the world, but totally distinct from those found further north.

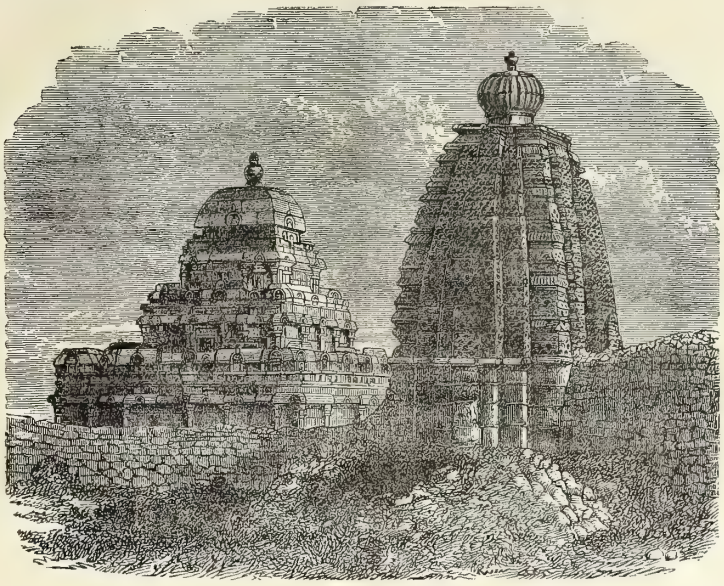
The next great immigrations commenced a century or two before the Christian era, and continued through the centuries immediately following that event. They came across the Lower Indus, occupied Guzerat and Rajpootana, and eventually extended to the Mysore on the one hand, and to Agra and Delhi on the north. The fourth great immigration was that of the Mahommedans, from the 11th to the 13th and 14th centuries. They came across the Upper Indus, and eventually spread down as far as the Mysore, occupying the whole of Indus more nearly than any of the preceding races. The fifth civilization is our own. We are the only people who came, not across the Indus, but by sea, but of course I need not allude either to our ethnology or our art on the present occasion.

Now, what I want to tell you this evening with regard to this branch of my subject is, that all this is written as clearly in the architecture of the country as if it were engraved on the map. No one who travels through the country, and is familiar with such researches, can fail to perceive easily when and where the Buddhist religion arose, and how far it spread—how pure it was at first, and how it gradually became idolatrous and corrupt, and how at last it perished beneath its own overgrown hierarchy. Nor can he help seeing how the Jaina religion superseded Buddhism among the Rajpoots, and how that eventually degenerated into the religion of Vishnu, which is its present and corrupt form.

The limits of the Dravidian style are equally strongly and clearly marked, and from their architecture we learn how far they ever penetrated northwards, and at what time, and where from, and when they were pressed backwards by the northern races. We can see the aboriginal tribes of Bengal, who were driven to the hills by the Aryans, and who retained their ancient faith in spite of the Buddhist reform, emerging from their fastnesses, in modern times, and gradually extending their style over the plains they had originally occupied. In fact the architecture of the country may be considered as a great stone book, in which each tribe and race has written its annals and recorded its faith, and that in a manner so clear that those who run may read.

All this ethnography, you may object, can be learned from the language of the people, and this has already been done to a great extent. Perhaps it has; and, if you will learn Sanscrit and Pali, and all the Pracrits—if you will master Tamul and Teloogoo and Canarese—and study Bengallee, Maharattee, Gujerattee, and 50 other dialects, and if you are tolerably familiar, in addition, with Persian and Turkish, you may acquire the knowledge I have been pointing out, provided you can ascertain where all or each of these languages is or was spoken in India, and when it was introduced and ceased to be used. Even then the architecture has the advantage that it is more distinct, that it never shifts its locality, and that it does not change with time: and in India especially, where we have so many rock-cut examples, we know exactly what the religion, what the art, and what the civilization of the people were who excavated them. We stand actually, as it were, beside the people who were hewing the mountain into form, and we can read the thoughts they then were wishing to express.

It is the same with the structural buildings. To take one instance among many. I have here a representation of two temples at Badamee, on the limit between the northern and southern architectural provinces. Anyone at all familiar with the subject will at once recognize the difference between the two. That on the



Dravidian Temple. Bengalee Temple.
at Badamee.

left is a straight-lined low pyramid, divided into storeys and adorned with pilasters. That on the right is curvilinear, with no trace of storeys or pilasters, and instead of the domical form that crowns the one it terminates in a conventional fruit-like ornament. I know that the people who erected the first must have been speaking Sanscrit or some of the allied languages when at work upon it, and that those who erected the other were speaking Bengalee or some tongue with a strong infusion of Sanscrit in its composition. If we knew their dates we could tell when the southern races extended so far north as this, or when the northern people penetrated so far south. So it is all over the country.

It seems almost impossible to over-estimate the value of these stone landmarks in a country where so few books exist, and so little history, and where what does exist is so very untrustworthy. So far as I can form an opinion, the architecture of India is not only the best means of elucidating the manners and customs of the country, but of checking their fables, and is frequently the only means that remain to us; and, if this be so, is it possible to over-estimate its value to those who wish to know who and what the people are or were whom we have undertaken to guide and govern?

It is not, however, only the ethnography that the architecture of India seems so completely to illustrate. It equally seems to fix the ever-varying form of the religions of that country, and to preserve them for our examination. In a country where printing was till very recently unknown, and where the climate is so destructive of writing materials, old books rarely exist, and it was too frequently the fashion to adapt each such succeeding transcription to the taste and feelings of the day. It is, consequently, only by an appeal from the paper to the stone book that we can know how far a religion had become degraded at any time, or when it prevailed, and by what people it was practised. One of the great characteristics of Indian architecture is the profusion of sculpture, which forms an absolutely essential part of it. And in this sculpture, more truly than in any written document, we can read the exact form of faith at any particular period.

There is still another aspect in which the architecture is vitally important, and that is with regard to history. I need hardly tell you that in India there are no written annals which can be trusted. It is only when they can be authenticated by inscriptions and coins that we can feel sure of the existence of any king, and it is only when we can find his buildings that we can measure his greatness or ascertain what his tendencies were, or what the degree of civilisation to which either he or his people had attained.

If the study of the architecture can make all this clear, I think I need hardly say that if anyone wishes to know what India was or is he cannot be far wrong in applying himself to its investigation.

It is practically more difficult to make the second part of my subject intelligible in a few words than it was with the first; but as I shall not have this time to deal with so unfamiliar a subject, or employ so many outlandish names, it may perhaps prove more interesting to my hearers.

In attempting to explain to you the importance of Indian architecture as bearing on our own, you will not of course expect me to recommend that you should copy any of its forms, though I believe there may be principles which it might be well to introduce, and suggestions which there might be no harm in adopting. The great merit, however, of its study I conceive to be the widening of our base of observation, and so enabling students to realise the true definition of the art, for till that is grasped there seems little hope of any improvement in our architecture.

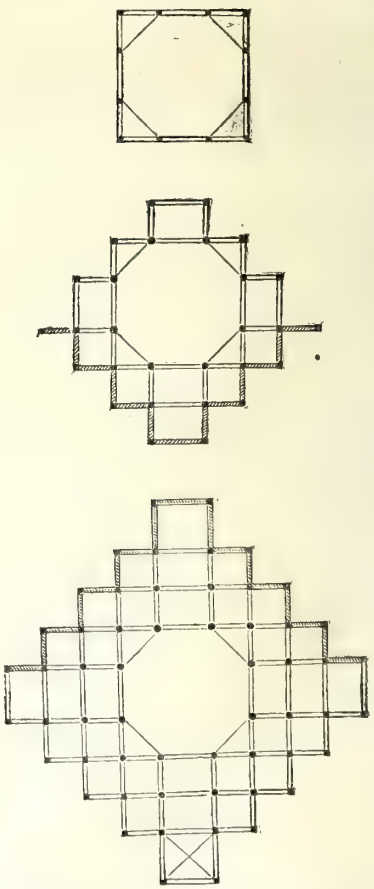
I may perhaps make what I mean clearer by referring to our own recent experience. During the last century, when the education of gentlemen was confined to the classics, we knew and practised only Roman architecture, and as the middle and lower orders of our countrymen had no sympathy with Doric or Corinthian orders, they were content to go without architecture altogether. In the beginning of the century Greek architecture was practically discovered, and eagerly adopted by the highly-educated classes, but in the same manner as the other. We copied it without having any real sympathy

with it. At last we discovered that the middle ages had also an architecture of their own, and one with which we had, or might have, infinitely more sympathy. This was an enormous gain, not only because it enlisted a much wider class in the art, but more because it taught the architects how much wider the field of architectural design was than had been originally supposed. Unfortunately we took to copying Gothic art, as we then copied classical, and so far retarded progress. At last we begin to be tired of reproducing old things, and are beginning to think, instead of copying. The first symptom of this is that classical designs are not so rigidly classical as they were, but a certain amount of Gothic feeling is instilled into them; and Gothic designs are sometimes not so ludicrously mediæval as they used to be, but a certain amount of refinement, and of modern feeling and adaptation is thought expedient in civil, though hardly yet in ecclesiastical architecture. The two are approaching one another. When they are fused we shall have an architecture of our own; and I know nothing so likely to lead to such a result as the study of an entirely foreign style like that of India. I feel certain that no one can familiarise himself with Indian art without feeling that the architects of that country were as successful as either those of Rome or the Middle Ages in reaching the aims they were aspiring to; though in doing this they employed arrangements as different as possible from those we are furnished with, and adopted details and forms diametrically opposed in principle to those we have hitherto been taught to admire. Of course a man requires to familiarise himself with these forms before he can admire them, and he must understand their application before he can appreciate their adaptability; but once he has conquered this, it seems to me impossible he should arrive at any other conclusion than this:—That there is no form into which stone can be carved which is not beautiful if it is appropriate to the purpose for which it is employed, and that no form is preferable in architecture to any other form, except in so far as it is constructively better adapted to express the purpose for which it is placed where it it is found.

The principle in fact is the same that pervades all the works of nature. I defy any one to give a good logical reason why the forms of a man's nose, or ear, or head, are beautiful. There is nothing in the shape of an eye, or an arm, or leg, or hand, or foot, that is beautiful abstractedly; but they are all beautiful, because they are exquisitely adapted to the purposes to which they are applied. So in every animal and every plant, when we understand and appreciate its structure; and the highest merit of architecture, and the noblest lesson we learn from its study, is, that of all man's works it is most like those of nature in principle and may be judged by the same rule.

As architecture has hitherto been studied it has been impossible to perceive this: and so long as we continue cribbed in the narrow school of classical or Gothic art it will be impossible to rise to such considerations. Once a man gets out of that groove, and perceives how wide the field is and how certain the result when following certain principles of common sense, the art becomes easy and failure impossible, and that principle may, I conceive, be more easily learnt in India than anywhere else I know of. This facility of learning arises not only from the immense number and variety of the ancient examples in every part of that country, but because you may now see those who can neither read, nor write, nor draw, building temples and palaces as beautiful in form and detail as those of their forefathers, and which are not copies, but elaborated on the same principles as resulted in the productions of our great mediæval cathedrals. But I must not detain you too long with these abstract doctrines. The lesson, I conceive, that every one must learn who studies such an art as that of India is, that a man can hardly fail in producing a good design if he thinks of what he is doing, and how he can do it best. Not only in architecture, but in every similar art, a thoroughly purpose-like and appropriate design must be permanently successful. The most obvious proof of this is, that in Egypt, as in Greece and Rome; in the middle ages, in India and Cambodia, or China; even in Mexico and Peru; in every age and in every part of the world men, in every stage of civilisation, succeeded in producing beautiful and appropriate objects of architecture. Failure was unknown, till in the fifteenth century some evil-minded persons took it into their heads to revive, by copying classical art. Since that day success has been impossible, with all our civilisation and power, with all our mechanical skill, for since then nothing but failure after failure has marked the architecture of Europe. If, however, architects could once be taught to think, independently of copying, I feel convinced they might easily surpass all that has hitherto been done, and I do not know how they could learn this so easily and so pleasantly as by the study of an art which differs from all they have hitherto been accustomed to admire, but which still attains its ends as certainly and as successfully as is done in any of those styles with which we have up to this time been familiar.

Turning from these principles to the suggestions that may be derived from the study of Indian art, we approach a subject that admits of infinite illustration. I must, however, confine myself only to such as will explain what I mean, without attempting to do more. One of the best illustrations for the purpose that occurs to me is that of the arrangement of Jaina domes. Everyone



Diagrams of Indian Dome Construction.

will, I fancy, admit that abstractedly the dome is the most beautiful form of roof that has yet been invented, but there are very great difficulties in fitting its circular outline to the square and rectangular form of our halls and churches, and it is in consequence rarely employed in Europe.

In India they have surmounted these difficulties with great success, and generally in the following manner. As a rule the dome rests on eight pillars, but as an octagonal outline is necessarily a weak one, they almost invariably add four pillars, one on each angle, which makes up the number to 12, and the figure to a square. This in itself forms a very pleasing pavilion, and is very generally used in this form. When an extension is wanted two pillars are added on each face, making a quasi-cruciform plan with 20 pillars; or again four are added on each face, making 36 pillars, or again five on each face, making up 56 pillars, which is the largest number I ever saw employed in a single porch.

Now, I have no hesitation in asserting that the pillars of the porch are more artistically arranged than any equal number in any building in the West. In the first place, the octagon in the centre has the happy property that when its sides are produced into a square they are in the ratio of 10 to 7, and this proportion consequently prevades the whole structure, the length of the greater and lesser aisles being in the same ratio. In Gothic buildings the ratio of the side to the centre aisles is as one to two generally, and the height of the principal one is also doubled. Here they are of one height, and just in that proportion which is best suited to give dignity to the central without overpowering the side aisles. By this arrangement, also, the principal aisles are longer than the minor ones in the same ratio, as they run along the diagonal of the square. But the greatest beauty of the arrangement, perhaps, is the position of the dome in the centre exactly where dignity is wanted. The only attempt at a similar effect in Gothic architecture is at Ely. The central lantern there is beautiful in so far as it follows this arrangement, and fails just because it does not carry it further.

Externally the effect is as happy as it is internally. The breaking up of the external parts gives a play of lights and shades, and a sparkling brilliancy of effect, not to be obtained by any other means that I am aware of, where the salient and re-entering angles give those vertical lines which the Gothic architects sought, somewhat clumsily, to attain by the employment of buttresses and other mechanical expedients.

Fortunately, any one who wishes to form an opinion as to the beauty of this arrangement internally can do so by paying a visit to the Church of St. Stephen's, Walbrook. It is avowedly Sir Christopher Wren's master-piece, and, both on the Continent and in this country, allowed to be one of the most beautiful classical interiors erected in modern times. The success is entirely owing to its architect having hit upon the same idea as the Jaina architect. In some respects it is inferior to his work, but this arises either from the space in the City being limited, or from Sir Christopher Wren not having carried the principle far enough.

It is not only, however, in constructive arrangement that the Indian architects might afford important suggestions. There are probably few things our Gothic antiquarians are so justly proud of as our window tracery; but I question if there is anything in Europe of that class so beautiful as the windows of the Bhudder at Ahmedabad. There is in them just that admixture of constructive form with conventionalised nature, which makes up the perfection of decoration in all styles; and if those windows were glazed with coloured mosaic glass in that brilliant harmony so general in the East, it would be difficult to match them for beauty in their class from examples in any other style. Besides these, however, there are some hundreds of examples of the same class of decoration at Ahmedabad used merely as ornament, and consequently hardly constructive, but such as might be freely copied in metal or in terra cotta, and if used appropriately would be more beautiful than anything of the kind we have yet seen.

One other peculiarity of our Gothic style, to which we are accustomed to turn with pride, is the form of the pendants from our Gothic roofs. Those, however, which the Jains in Guzerat hung from the centre of their domes are not only more beautiful in form, but far richer in ornament, and with every detail so exquisitely designed for the place in which it is put, that our Gothic architects must yield the palm to them in many respects.

It would be easy to go on multiplying examples of this sort but time will not permit, and without detailed illustration it is impossible to make the subject understood, and I shall not therefore attempt it. Before concluding, however, let me call your attention to another subject, though its interest is more archæological than artistic. You have all heard what a bone of contention the age of cromlechs, and dolmens, and menhirs is to our antiquaries, and how much divine wrath the discussion excites in certain bosoms. Now here is a new fact for discussion. In the spring of the present year a surveyor, luckily not a railway surveyor, for had it been the latter the monuments would before this have been utilized, but one employed in the trigonometrical survey, in cutting his way through the Neermull jungle, half-way between Hydrabad and Nagpore, came to a group of cromlechs and crosses, of which he made some photographs and sent them home. The cromlechs are identical in every form with those in Britanny and Wales. The crosses, nine to ten feet in height, are such as might be found in Ireland or in Kensal-green Cemetery. That they are of Christian origin can hardly be doubted, and that they are of the same age as the cromlechs seems a certainty, and that they belonged to the same people. Who those people were, and when they lived, I must leave to others to determine. All I wish to point out here is that it is another point of interest in the study of architecture in India.

Allow me, before concluding, to recapitulate as briefly but as clearly as I can, the principal points on which I have dwelt in the preceding paper, in order that you may see how I have made out my case, or made myself understood.

I consider the study of Indian architecture important because it affords the readiest and most direct means of ascertaining the ethnological relations of the different races inhabiting India. It points out more clearly than can be done by other means how they succeeded each other, where they settled, how they mixed, or when they were absorbed.

In the next place, I consider it important, because it affords the best picture of the religious faiths of the country, showing how and when they arose, how they became corrupted, and when and by what steps they sank to their present level.

It is also, I believe, important because in a country which has no written histories it affords almost the only means that exist for steadying any conclusion we may arrive at, and is a measure of the greatness or decay of the dynasties that ruled that country in ancient times.

These considerations refer wholly to India, and to the importance of the study as bearing on Indian questions only; but I consider it as important also, because of its bearings on architectural art in our own country. First, because by widening the base of our observations and extending our views to a style wholly different from our own, we are able to look at architecture from a new and outside point of view, and by doing this to master principles which are wholly hidden from those whose study is confined to one style so mixed up with adventitious associations as our local styles inevitably are.

It is also important because architecture in India is still a living art. We can see there, at the present day, buildings as important in size as our mediæval cathedrals erected by master masons on precisely the same principle

and in the same manner that guided our mediæval masons to such glorious results.

It also is, I conceive, important as offering many suggestions which, if adopted in a modified form, might tend considerably to the improvement of our own architectural designs.

Lastly, I consider the study worthy of attention from the light it may expected to throw on some of our own archæological problems.

Besides these seven there are many other reasons that I could urge to prove that the study is worthy of more attention than it has hitherto received; but if I have succeeded in making these at all clear, they are amply sufficient for my purpose. If you feel at all with me on the subject, I need no apology for concluding by saying that if Indian architecture is worthy of study, it is worth while that something should be done to obtain the materials requisite for that purpose; and I do hope that some sort of organization may be got together to collect and bring home such representations of Indian buildings as may render the study easy and accessible to all. A good deal has been done lately, but it has been done without system. Those temples only have been photographed which are situated near to where some artist with the necessary apparatus happened to reside. Many of the most important are still unrepresented. In no instance —except one—have they been accompanied with the plans or measurements or descriptions necessary to make them intelligible, without at least a very disproportionate amount of study. By organisation all these difficulties might be avoided, and with it I think the results would be such as would surpass the most sanguine anticipation.

If anything is to be done it ought to be done quickly, for in a tropical climate like that of India "decay's effacing fingers" work much more rapidly than in a temperate climate. Vegetation there is also an active power, always tending to tear down temples and destroy the most elaborate buildings; and there is a third power more perniciously active than either in the shape of the barrack department, which is fast obliterating beauty in the land. Within the last few years one-half of the palace at Delhi has been pulled down to make way for a regimental barrack. The fort of Gwalior has still more recently been handed over to the department, and everywhere, from the causes above-mentioned, destruction is stalking over the land, so that unless something is done, and done quickly, to perpetuate by representation the forms of those beautiful buildings, it may be too late, and their memory pass away for ever.

As I hinted, when I commenced, might be the case, I am afraid that what I have said has taken rather too much the form of dogmatic assertion, but I appeal from myself to the walls; and I feel sure if any of you will take the trouble to examine, with any degree of care, the photographs there displayed, you cannot fail to be convinced that the study of Indian architecture is worthy of the attention of every true friend of India and of every true lover of art.

DISCUSSION.

Mr. Henry Cole, C.B., remarked that if anything were wanting to convince Englishmen how much there was in India of which they were ignorant, it was the able paper they had heard this evening. His own impression was that they knew very little indeed of India, excepting what they read in price currents of grey shirtings, twills, cotton twist, indigo, &c.; of the people of India they knew very little; and of their architecture still less. He thought it hardly too much to say that there were scarcely half-a-dozen architects in this country who could pass even a preliminary examination in Indian architecture; and yet here was the great fact before them that there was an architecture, whether beautiful or ugly did not affect the question, which might be said to be the history of a people living in a state of considerable civilisation even 500 years before the Christian era. There were so many points presented in the paper that he could only venture to offer a few remarks on one or two of them. He was greatly surprised at the number of photographs exhibited on the walls this evening, and he thought if they wanted a proof of the great value of photography to art they found it now before them. Photography, in representing the human face, did not, perhaps, often make it beautiful, but it certainly gave most accurate representations of architecture and sculpture. That the architects of this country should know very little about Indian architecture was not surprising when they recollected that even within the memory of members not older than himself, they knew very little about Gothic architecture. Fifty years ago nobody knew anything about Gothic architecture, and he remembered being sent to look at the new church of St. Luke's, Chelsea, as something wonderful and novel; and yet they knew how great a revival there had been in that branch of art. If such had been the case with Gothic architecture, he thought that eventually they might hope to have some knowledge, at least, of the architecture of India. Not more than a hundred years ago Horace Walpole built that structure which was then thought to be excellent Gothic, at Strawberry-Hill; and scarcely fifty years had elapsed since Wyatt, in Durham Cathedral, exercised his taste in what he considered to be Gothic; and yet at the present time there was not an architect's pupil who would not consider himself disgraced if he had produced such work. He therefore did not despair of seeing Indian architecture studied in this country, but he wished to be understood that he did not desire to see it copied. While upon this subject he might mention that visitors to Paris next year would see a building in connection with the exhibition there, the design of which was somewhat in the form of a Mohammedan temple, suggested by Mr. Hope's book on architecture. In the English department of that exhibition it had been found necessary to erect a building to contain several boilers, which were in the first place to be exhibited as specimens of manufacture, and also to be used to drive the machinery. Of course, in connection with the boilers there must be chimneys, and it was desired to have them ornamental; the building must also be extremely airy, so as to make it as cool as possible. Looking over Mr. Hope's work on architecture they found a representation of a mosque of which Syeed Oosman was said to have been the builder, and this gave them, in addition to extremely ornamental forms, like chimneys, colonnades, which afforded open spaces for the public to inspect the boilers in. It was most remarkable how much influence the display of Indian productions shown in the Exhibition of 1851 had had upon our taste, especially in the manufacture of carpets and other fabrics. Mr. Peter Graham, a competent witness, was present, and could testify to this. Instead of flaring patterns in perspective, they had decorous flat patterns, on which they could place furniture without feelings of discomfort, and it was the fact that a large trade had since been established in Mussulipatam carpets. The same influence, he believed, would ultimately be exerted by the architecture as by the manufactures of India. He also remembered that in the Exhibition of 1851, whilst they had these beautiful patterns designed by the benighted people of India, there were beside them some most abominable imitations of European patterns. Indeed, there was nothing so bad as when an Indian attempted to copy European art; and he confessed he had some fear lest the schools of design in Calcutta, Madras, and Bombay, instead of leading the natives to advance in their own styles of art, would create a hybrid style, the most detestable ever seen. In his opinion we had a great deal more to learn from the Indians than we could hope to teach them in the designing of patterns, and he protested against schools of art in India, which should corrupt native talent and taste. He might mention

another point. He read in the *Builder* a little time ago, that for the University of Calcutta it had been determined to adopt the Doric style of architecture. It might possibly be right to have Doric columns in the University of Calcutta, but it could hardly be right that they should be of cast stucco imported from England. Could they conceive anything more likely to debase Indian art than taking cast stucco columns from England to Calcutta? Mr. Fergusson had alluded to the importance of having some kind of systematic mode of collecting information on the architecture of India. He was quite sure, supposing they none of them cared at all about art, they must nevertheless feel an interest in the millions of human beings who were at present subjects of Queen Victoria, and must long to know something about this remarkable people. He would ask how that rude cross and cromlech, shown in a diagram on the walls, could have got into the place where it was described to have been found? It was a veritable duplicate of Kit's Cotty-house in Kent, and yet it was in the midst of a dense jungle. Let them try and penetrate the history of such things as these. Mr. Fergusson had suggested that they should go on systematically obtaining photographic representations of objects of art in India. He (Mr. Cole) hoped some plan would be arranged by which we might be able to have in this country a systematic collection of photographs of Indian buildings; there were already skilful photographers high up the hills in India, who were in possession of thousands of these photographs—and he hoped we should soon see them in this country. He was enabled to state that it was intended that in the Indian court of the Paris Exhibition Indian architecture should be represented. In addition to photographs he would suggest casts. Only the difficulty of cost, which Englishmen very soon overcame, stood in the way of procuring casts of all the typical buildings of India. The public money had been already employed in obtaining casts of the finest objects in Italy, Spain, and France. We had recently imported into this country, at a cost of between £2,000 and £3,000, a cast of the beautiful gate of the convent of Santiago, in Spain; and if we were to have these casts from Spain, it would be well to have them from India also. This was the more important when it was recollected how rapid was the destruction of such works in that country from various causes; and while on this subject he would read the following extract from a work on the architecture of Ahmedabad, which showed how wantonly even those who ought to respect such monuments sometimes treated them:—

"Seedee Syeed's mosque at Ahmedabad is now built into the north-eastern corner of the modern wall of the 'Bhudder.' Its position exposed it in after times to more than usually rough treatment. After being desecrated by the Mahrattas, it has been converted by the British into one of the public offices, and has been hacked about to suit official convenience as much as the Chapter House at Westminster. But its principal glory still remains intact in two windows of perforated marble, which may be safely affirmed to be unrivalled throughout the East. Their dimensions are ten feet wide by seven high."—*Architecture of Ahmedabad*, pp. 46, 47.

Though he sympathised with the feelings that would abstain from robbing a country of its treasures, yet he thought when they were converting palaces and mosques into barracks and offices for Government clerks, they might be allowed to put in a word on behalf of saving treasures like those described by Mr. Fergusson, and applying them to more appropriate uses. If the India Museum in Whitehall could not be adequately extended, some other place might be found in which those rich stores of ancient art might be deposited. Members would recollect that in 1852 this Society announced its intention of forming a large and comprehensive exhibition of Indian art. A correspondence on the subject was opened with the Indian authorities, and their late President, the Prince Consort, was consulted, and gave his cordial support to the plan. Various difficulties, however, prevented the realisation of the scheme, and the objects already collected were handed over to the authorities of the Dublin Exhibition. If the Society would, at a future time, again take up the idea, and hold a complete Indian Exhibition, embracing a proper representation of architecture, coupled, perhaps, with a complete colonial exhibition, he believed a most interesting and valuable display would result. Speaking as a member of the Society, and not as one of the Council, he would urge upon the members, if they took an interest in the subject, to endeavour to get up a thorough representation of the arts and manufactures of India as well as of the products and raw materials of its commerce. On the occasion to which he had alluded, in the year 1852, there was great difficulty in providing a building for the exhibition, but that difficulty would in a year or two be removed. There would then be in existence a building, the great Central Hall, which would be sufficiently large to accommodate an exhibition of this kind, besides a good many other things.

Colonel Scott, R.E., said, as it appeared that the publication of the works by Mr. Fergusson on Indian architecture had been discontinued, he would suggest that, now a much deeper interest was taken in the subject, means might be found to carry on the work to completion. He would also take the opportunity of asking Mr. Fergusson to what extent he considered the architecture of any one of these races of India had influenced the architecture of the race that succeeded it, and whether in the architecture of the present day any purer system was followed, or whether what was styled by Mr. Cole a hybrid character of architecture now prevailed in India.

Mr. Fergusson replied, on the first point alluded to, that he did not feel it to be desirable to resume the publication of the works referred to, inasmuch as photography had so largely supplied the place of the large lithographic drawings by which the works were illustrated. He had, however, in a later work (which was complete, though not yet actually published), gone through the whole subject again with considerable additions. What he would prefer would be to take up the whole subject *de novo*, in a separate work, amply illustrated. The only consideration was that of expense, for such a work would never pay, and it was hard to expect an author to spend his money as well as his time; so that as there was no public fund applicable to such a purpose, the work must remain in abeyance till means could be found to publish it. With regard to the second question, the styles in India had changed like those in this country, but each was a complete indication of the race of people to which it belonged. Each style differed from the preceding one, but was entirely without foreign admixture; and when they were familiar with the whole, the ethnology of the people was distinctly to be traced in the different styles. Where European influences prevailed architecturally, as in Lucknow and Hyderabad, the style had become corrupt and bad to the last degree, and all Mr. Cole had said was not half the truth.

Mr. J. Crawfurd would not attempt any criticism of the interesting paper read by Mr. Fergusson. Indeed he was not competent to do so; for Mr. Fergusson certainly was the best-informed man in the country on the subject he had brought before them. There were some points, however, on which he entirely differed from him. For instance, the Aryan theory he utterly disputed. Mr. Fergusson would have it that India was chiefly peopled from abroad, but that he (Mr. Crawfurd) did not believe. He believed that Nature made India a fertile country, and peopled it just as every other portion of the world was peopled. That there had been invasions of India in different ages there could be no doubt, and the invading tribes soon became merged in the native population. Mr. Cole had argued that we knew nothing of India except through the price currents of the markets; but he (Mr. Crawfurd) entirely dissented from this, and contended that we knew a great deal about India. Mr. Cole had perhaps not made it his study, but many persons had devoted the best part of

their lives to the subject, and ought to know something about it if they did not. The architecture of India was certainly wonderful and curious, though he thought not very beautiful or graceful; and he contended that we were a more advanced people in this respect than those of India. He was not for imitating Indian architecture; but in many respects they might well imitate our architecture, and, for his part, he believed they would improve in proportion as they imitated it. Very much remained to be done in the way of improving domestic architecture in India. Their temples were large and gorgeous, but they had, in fact, no domestic architecture, and their dwellings were mere huts. All that had been done in the way of architecture had been bestowed upon their false gods; and he knew of no Indian architecture except that which was of a religious character.

Mr. Peter Graham ventured to hope that Mr. Fergusson, in addition to allowing his valuable collection of photographs to remain in that room during the Christmas week, would permit them to be further exhibited at the South Kensington Museum for some time longer. It would, he believed, greatly gratify the public and render service to art in an architectural point of view. Mr. Cole having appealed to him with regard to the influence exerted upon the manufactures of this country by the Indian department of the Exhibition of 1851, he had no hesitation in stating he entirely concurred in the views of that gentleman. Followed up as that was by the exhibition at Marlborough-house, for which he believed they were mainly indebted to the personal exertions of Mr. Cole, a great and beneficial influence had been exercised upon the taste not only of manufacturers, but the public at large. He believed he was warranted in saying that in the choicest specimens of ornamentation of the *cinque-cento* period there might be traced an influence derived from eastern objects of art that had been seen by the artists of that period. This could be discerned most distinctly; and he thought they could not do better than study those works—he did not mean as copyists—but as affording suggestions by which taste in the manufactures of this country might be improved.

Mr. Robert Rawlinson, C.B., said that when he looked at the numerous photographic representations of these buildings on the walls of the room, and while listening to the eloquent remarks of Mr. Fergusson with regard to them, he could not but ask himself the question—what was the purpose and utility of such large structures as these? And when they were called on to admire them as beautiful pieces of construction, they could only do so by considering the kind of people who constructed them, the climate in which they were placed, and the purposes they were applied to. He must express his opinion that architects even at the present day did not sufficiently consider what were the purposes for which their buildings were required. Huge public buildings were erected, and subsequently certain "dodges" had to be resorted to make them habitable. That was especially the case in the Treasury-buildings, where all sorts of contrivances were resorted to to produce ventilation; and looking at the outside of the houses in London generally, they could not but notice all kinds of hideous appliances employed to induce the smoke to go up the chimneys. As a sanitary engineer he felt that before they went to the study of Indian architecture they should learn to perfect their architecture at home, and make it really useful. Looking at the representation of the great Dravidian Temple (p. 72) he had no hesitation in saying, in a sanitary point of view, it was an abomination, though possibly it might have architectural merits. It could not be lighted as it should be, nor could it be sufficiently ventilated. At the same time many valuable lessons might be learned from the East, especially their mode of making and arranging tiles, of using mortar, and of construction generally. The employing architects and engineers, and allowing them to send out articles from this country for use in India, was an enormous waste of the public money. He knew that many things sent out from this country to India served no better purpose than affording a good commission to the parties who gave the orders for them. In water-works construction it was evident that the Hindoos were in advance of us. There were reservoirs in India, 2,000 years old, and we might learn a lesson from them in this respect. A water supply, however, was about to be provided for Calcutta by a conduit 14 or 15 miles in length, from the Hooghly into the city. It would hardly be believed that that conduit was to consist of cast-iron pipes, sent from this country, to be laid in a marshy subsoil full of salts, where it could only last about twenty years. If that conduit had been built of Hindoo bricks, by Hindoo workmen, it would have been executed at half the cost, and might have lasted 2,000 years. He happened to know that in India there was a vast deal to be done in the way of building, of various kinds, for years to come. There was an army to be maintained at less cost of life than was the case at present, and several millions of money were to be spent in providing adequate barrack accommodation and improving the military stations of the country. He did not think it was a wise step to turn attention to these disused temples for hints as to the best mode of construction, but he did think the works should be constructed of native materials and by native labour, though upon the best plans that modern civilization could suggest.

Mr. J. Beavington Atkinson said the subject introduced this evening suggested one or two inquiries. The first was how far the Mohammedan architecture, of which there were such beautiful examples in the room, could strictly be called Hindoo. The date of that architecture was 1200 of our era. They were perfectly well acquainted with it in other portions of Asia, and also in some parts of Europe. They knew what it was in Cairo and Constantinople, and also in Spain. The Mohammedan architecture which they found in India was, he ventured to say, except in some minute details, that which was known as Arabian architecture planted in a new soil. They had the glorious dome and pointed arch peculiar to that architecture, which gave it a significant character wherever it was seen. Then, with regard to the ethnology of architecture, that was a very vague and conjectural term, and he ventured to ask whether, in order to get at anything like the origin of Indian architecture, they must not go back to a date far anterior to that of the oldest building represented by these photographs. If he had rightly read the works of Mr. Fergusson he believed the earliest building of which they had a record was something like 250 years before Christ, whereas Thebes and Memphis were supposed to have been founded 2,000 years before Christ, and Rome 750 years; whilst the great period of the Greeks was, he believed, nearly cotemporaneous with some of the photographs exhibited. Therefore, he would ask Mr. Fergusson how much further it was possible to go back in chronology in order to arrive at the ethnography of the arts of India, and whether between the eastern and western architectures there could be traced any correspondence as to the details. As to the exact merits and position of Indian architecture it would be presumption in him to offer an opinion. One criterion of merit in architecture was the relative perfection of the figures employed in decoration. Supposing these buildings to be contemporaneous, or nearly so, with the Greek temples, their artistic position would be somewhat indicated by the drawing and modelling of the figures in these façades as compared with the great Grecian works of art.

Mr. Philip Palmer remarked that the late Sir Joseph Paxton, in his plan of the exhibition building in Hyde-park, illustrated the principle of building by the multiplication of parts, but if he understood Mr. Rawlinson rightly, he appeared to think that a building of that form could not be well lighted and ventilated. They could hardly expect glass to be used in such structures

in India; but it had been shown that in this country it was possible to erect buildings on that principle and at the same time to secure thorough lighting and ventilation.

Mr. Fergusson, in reply upon the discussion, said Mr. Rawlinson laboured under a mistake in the views he had expressed relative to the square form of temple he referred to. It was impossible within the limits of a paper to point out all the details, but there were no separate apartments in the building, as Mr. Rawlinson had supposed, but the building, of which the plan was given on p. 74, was in fact a vast porch, standing on 56 pillars, and was perfectly open, the ventilation being of course admirable. The Dravidian Temple belonged to a different style of architecture and a different age altogether. He had endeavoured to make it clear that he by no means wished these productions to be copied. All he said was that there were principles in these buildings which were worthy of the study of architects, and it was by going to foreign styles, where they were not hampered by association, that they could most clearly understand what the true principles of architecture were. With regard to the remarks of Mr. Crawfurd, as to the absence of domestic architecture in India, that gentleman must surely be aware of the existence of numerous large and beautiful palaces which, in point of form and ornamentation, were equal to anything in Europe. In reply to the question of Mr. Atkinson, as to how far Mahommedan architecture was Hindoo, and why he had applied the term Mahommedan to it, he would refer to the circumstance that when the Mahommedans went to Constantinople they did not take with them the architects of Cairo, Syria, Spain, or Persia, but they literally copied the church of St. Sophia, which they found there, in the works which they erected in that city. Wherever the Mohammedans went they introduced no style of their own, but employed the native people to build their mosques for them; and this accounted for the fact that some of the most beautiful Mahommedan buildings in India were purely Hindoo from first to last. With regard to the ethnography of the buildings, he could not in India get beyond 250 years before Christ, but, as far as general knowledge on the subject went, from the building of the first pyramid in Egypt down to the present day in India, and down to the 13th century in Europe, there was not a single building which did not more or less mark the ethnography of the people who built it. What gave the architecture greater interest was the fact that they could trace this ethnological relation not only in India but also in Africa and China, and other parts of the world. Indian architecture itself formed but a small branch of this subject, though a pleasing and important one, because, from the want of inter-communication, they retained their peculiar idiosyncracies to a larger extent and more distinctly than any other people he knew. With regard to the request made by Mr. Graham, he should be happy that the photographs should go to South Kensington; but he hoped before long there would be a better collection in that establishment.

Sir Thomas Phillips, Q.C., said, before the closing of the discussion on the admirable paper they had heard, it might not be inappropriate to the presence of the chairman (Sir James Fergusson) that the meeting should pronounce what he was sure they all felt, viz., that it was the duty of the Government of this country to do what in them lay to preserve as far as possible the recollection of those great architectural works throughout our Indian dependencies. Without entering into the disputed question of how far those buildings were really beautiful, there seemed no doubt that, as the rulers of a great people, who had occupied a territory extending over a considerable part of the globe for a period of 2,000 or 3,000 years, it was the duty of the British Government to preserve, as far as might be, the memory of those great and distinctive works of art. Happily, we were in possession of an art which enabled us to preserve the representation of these great monuments at small cost and with great accuracy; and he could not doubt that means would be taken for obtaining, especially by means of photography, such memorials as might be regarded as objects of real national interest. Mr. Fergusson had intimated that he had been asked to deliver a series of lectures on this subject, but had felt it necessary to decline doing so, from a conviction that he could not, in the limits of four lectures, bring before the public that accurate view of India which he desired; but four lectures would surely do more than one. They had listened to one with the greatest interest, and all who had done so, he was sure, would desire that it should be multiplied. He appealed to Mr. Fergusson, on account of his known devotion to the subject, the thorough love he had for it—and he could appeal on no higher motive—to gratify the Society by giving a course of lectures on Indian architecture.

The Chairman said the evident interest with which the meeting had listened to the very valuable paper which Mr. Fergusson had delivered, made him feel that it would be a mere matter of form on his part to propose that the meeting should accord their most grateful thanks to that gentleman. But he could not omit the opportunity to say how greatly the gratification he had felt at the honour conferred upon him, in being invited to occupy this distinguished chair, had been enhanced by the deep interest he had felt in listening to Mr. Fergusson's paper. It was certainly an unusual thing for an Under-Secretary of State for India to vary his ordinary duties, which he hoped were not altogether useless, by attending such a meeting as this and hearing such a subject discussed. He was usually confined to the drier matters of how to make Indian railways pay; how to pay the public servants in India; and too often perhaps, how not to pay them. In some of the speeches delivered this evening, rather pointed allusions had been made to the responsibilities of the home government of India, in which he had the honour to hold a humble position; and some slight imputation was cast upon the government on account of what were considered breaches of taste in connection with public works in India. It should, however, be remembered that the government of India was mainly conducted in that country; and not only were the public works promoted there, but the duty of preserving the ancient monuments of the country must be discharged by those who were on the spot. Great as the influence of this Society was, there were kindred societies in India, which showed that Europeans in that country were not unmindful of the subject which had been treated this evening; and the Society at home might be doing wrong in taking the matter out of their hands, inasmuch as through their agency, working through the government of India, they might accomplish the end in view. Undoubtedly it was desirable to possess authentic records of these monuments of ancient times, but it might be a question, with those who had to administer the scanty revenues of India, as to how far the public funds should be devoted to such a purpose. He ventured to think that if they wished to obtain these records from India, it could only be done for the most part by private enterprise; at the same time he was quite sure that the men at the head of the government were far too enlightened to be unmindful of these works of art, and that they would only be too happy to facilitate opportunities for procuring the memorials referred to, for any benefit thus conferred upon the arts in this country would be reflected back upon the people of India themselves. He believed the more the people of this country—especially the educated and learned classes—were led to bend their thoughts towards that great dependency, which involved such deep responsibilities upon ourselves, the greater would be the amount of benefit to the people of India; and he hoped that indirectly this might be the means of attracting more of the capital of this country to the development of the commercial re-

sources of India, while at the same time our rule there was not unmarked by attention to those arts which refined and civilised mankind. He was sure he carried with him the feeling of the meeting in tendering to Mr. Fergusson their cordial thanks for the paper he had favoured them with.

The vote of thanks having been passed,

Mr. Fergusson, in acknowledging the compliment, said, in answer to what had fallen from Sir Thomas Phillips, that on the present occasion he had made no attempt to describe the architecture of India, but only to illustrate two or three principles, which he thought would show the importance of the study. He had just completed a treatise on the subject, which would form a considerable portion of the second volume of his "History of Architecture," and he hoped that by this means, and by promoting the production and exhibition of photographs of the principal works, to do more to promote this study than he could hope to do by a course of lectures such as Sir Thos. Phillips had asked him to deliver.

PAYMENT OF FEES BY STAMPS.

In consequence of the Act which provides for the collection of fees in public departments and offices, by means of stamps, the Lords Commissioners of the Treasury give notice, with respect to the Companies Registration Office, that from and after the 31st day of December, 1866, the fees payable in that office shall be collected by means of stamps; and they direct that the following rules be observed:—

1. The stamps to be used for collecting the fees payable to the Registrar of Joint-stock Companies shall be procured and paid for by the persons liable to pay such fees.

2. All documents tendered for registration shall be according to the proposed forms, and bear an impressed stamp denoting the amount of fee payable for the same.

3. Where any such fees are payable in respect of any thing to be done in the Companies Registration Office, the person requiring such matter to be done shall make application for the same in the form kept for that purpose in the office, and an adhesive stamp denoting the amount of the fee so payable shall be affixed to such form of application.

4. On the necessity thereof being proved to the satisfaction of the Registrar, with his consent, the stamp denoting the amount of the fee payable may be either impressed on or affixed to any copy, second certificate, or extract so applied for in lieu of being affixed to the form of application.

5. All adhesive stamps affixed to any paper presented to, kept in the possession of, or delivered out by the Registrar, shall, before the Act is done in respect of which the fee denoted by such stamp is payable, be cancelled by some officer in the office of the Registrar.

6. That when any stamp has been cancelled without having been legitimately used, and the Registrar of Joint-stock Companies has granted a certificate that any particular stamp is a fit subject for allowance, it shall be competent for the Board of Inland Revenue to allow the amount thereof.

PUBLIC WORKS EXECUTED IN PARIS DURING THE PRESENT YEAR.

As the time approaches when masons' work must be suspended for the season, it is natural that the chroniclers of Paris should take reviews of what has been done for the improvement and beautifying of the city during the current year, and the list of works completed or under hand is surprisingly long.

In the old city, the Isle de la Cité, the restoration of the noble pile of Notre Dame has been terminated after a labour of twenty or more years, the handsome new building, or Palace of the Tribunal of Commerce, has been completed, the enlargement and improvement of the Palais de Justice has been pushed forward, the old Conciergerie and the Prefecture of Police, forming parts of the great pile the construction of which was commenced by Charlemagne, have been almost rebuilt, large new barracks have been erected, between Notre Dame and the Palais de Justice, for the Garde de Paris, with new buildings for the staff of the *sapeurs-pompiers* (military firemen), and that of the municipal guard, and an immense mass of old houses has been demolished to make room for the new hospital of the Hôtel Dieu, the walls of which are beginning to appear above ground. Little now remains of the interesting, romantic, dirty, and unhealthy *cité*, the heart of Paris for so many centuries, and still the Paris of the historian, the poet, the novelist, and the antiquary.

On the left bank of the Seine, large additions have been made to the station of the Orleans Railway, an *ouvroir*, or workhouse, by the Board of Public Charity, the continuation, still in progress, of the circular railway round Paris, the building for the Universal Exhibition next year, the completion of the great trunk sewer, and a church and market at Montrouge.

It is on the other side of the river, however, that the most extraordinary changes have taken place and the most important works have been executed or commenced. The corner tower of the Tuileries, called the Pavilion of Flora, with its remarkable sculpture, has been completed, a large portion of the gallery which connects the Tuileries with the Louvre has been rebuilt, and the remainder is in progress, and the spire of the Hôtel de Ville has been reconstructed: the heights of the Trocadéro have been completely changed, and a great Place formed there opposite to the Exhibition building, and the work is now being continued over the old village and quarries of Chaillot, an enormous undertaking; connected with this new Place, named after the Roi de Rome, the son of Napoleon the First, are the grand avenue of the Emperor, and the avenues of Josephine and Alma; in another part of the town the great Boulevard of Magenta has been opened from the Château d'Eau on the main boulevards across the Boulevard de Strasbourg and the old suburb of Clignancourt, by the foot of the hill of Montmartre, and across the plain of Saint Denis to Saint Ouen, a small town on the banks of the Seine, in a straight line for four miles; a wide street has been opened, and houses are in course of construction between the Pont Neuf and the great central market of Paris, and two other streets have been made in the same quarter; the completion of the great market itself is progressing rapidly, and the whole will be finished in a year or so; three streets have been opened up in the old dense neighbourhood of the Faubourg Poissonnière; a long street, called the Rue de Puebla, has been pierced from La Petite Villette to Charonne, in order to open up the sites upon which is being formed the new cattle market and abattoirs of Paris, and the park of the Buttes Chaumont.

Amongst special buildings which have been partially or wholly built are thirty schools, five new churches, eight other sacred edifices repaired, and two new mairies. The Great Northern Railway Station, one of the largest in Europe, has been completed. An ornamental garden has been formed around the Expiatory Chapel, which marks the spot where the remains of Louis XVI. and Marie Antoinette were concealed by the royalists until the restoration, and which had been opened up by the formation of the Boulevard Haussmann, which, also, has been completed this year. The great circular Place de l'Europe, the converging point of six streets, named after six European capitals—London, Berlin, St. Petersburgh, Constantinople, Madrid, and Vienna—has been entirely removed, and replaced by a six-way iron bridge over the Western Railway, which formerly was tunnelled below, and a fine new street, called the Rue de Rome, has been constructed parallel with the railway; the works neces-

sary for the widening of the railway at this point, and the formation of the street in question, had to be carried through solid strata of stone, in some places as high as a three or four story house.

The buildings of the Conservatoire des Arts et Métiers in the Rue St. Martin have been much enlarged, and some curious old buildings in the neighbourhood uncovered and brought to light. The compound bridge over the Seine at Auteuil, for the Circular Railway, has been finished; two or three markets have been rebuilt, on the plan of the great central Halles; the Bank of France is being enlarged and beautified; and many other public buildings have been under the hands of architects and builders. In addition to all this, the ancient outer boulevards, which form a circle around Paris of about sixteen miles in extent, have, to a great extent, been metamorphosed, widened, planted with trees, and will eventually form a grand promenade, with two roads for vehicles, a ride in the centre, and wide avenues for pedestrians.

Such is a hasty sketch of the works completed and carried forward in the city of Paris during the present year, and certainly neither ancient nor modern history can produce a parallel case. The map of Paris has been almost re-made, and no question of cost, convenience or interest seems to have been allowed to stand in the way of the completion of the work.

One arrangement, rendered extremely necessary from the great width of the streets and open places in Paris, has been borrowed from London, namely, the establishment of refuges for foot passengers at dangerous crossings; the form adopted is a large paved circle, with a handsome candelabrum of four or five lights arranged in a pyramid in the centre, and so great are some of the spaces formed by the intersection of wide boulevards, that in some instances two and even three refuges have been constructed in one open space.

Manufactures.

The Cultivation of the Mulberry Tree.—The following information on the cultivation of the mulberry tree in the kingdom of Siam will not be without interest. It is chiefly in Laos, or the kingdom of Lieng-Mai, a tributary to Siam, that the rearing of silkworms is carried on on some scale. The greater part of the silk produce is employed on the spot by native industry, so that very little of it comes to the Bangkok market. The annual export of this product does not exceed 50,000 kilogrammes (50 tons). Of late years several lots of it have been shipped for Europe. The Laos silk is of an excellent quality, but the means used for spinning are very imperfect, so that this product is placed amongst the inferior qualities. The Anamese, who are established in the neighbourhood of Bangkok, rear silkworms, but in small quantities. They understand the method of their treatment better than the inhabitants of Laos and Cambodia, and their products are better able to compete with the good qualities of China and Japan; but the whole of the silk produced by them is used for domestic pusposes, and none is found in commerce. The mulberry is the object of special care in Laos and Cambodia; but it equally succeeds in all the Siamese provinces, and the rearing of silkworms might be successfully carried on there, as proved by the attempts at Bangkok, which is less advantageously situated. It appears up to the present time that no epidemic disease has made its appearance either in Laos or in Cambodia. The Anamese employed in the rearing of the silkworms from eggs from Laos have observed that after that they have been reproduced three or four times a fresh stock should be obtained; this, however, seems to indicate a germ of disease. Should the worms a few days after hatching seem ill and not likely to succeed, the air is changed by taking them somewhere else; this often produces the desired result. If some crops are lost it is not due to the epidemic. The eggs are transformed into cocoons at the end of a month. Three or four crops of silk are usually produced yearly, during the months of May, June, July, and August. They can be reared during other months of the year, but with less success.

Spectacles.—The manufacture of spectacles appears among the Birmingham trades as early as 1784, and was doubtless carried on some years earlier. The "goggle spectacles" of our grandfathers were made here in large quantities, and the patterns remained unchanged till about 50 years ago. Even as late as 1820 hampers of spectacles were sent away like packages of nails or chains, to be distributed throughout the country. The frames were large, thick, and clumsy, mostly of some sort of white metal, varying according to price. As soon as steel wire became adapted for spectacles, a lighter and more elegant article was produced. At present there are at least ten manufacturers engaged in making spectacles, and about 200 hands are employed, Birmingham being the chief seat of the trade. Women and girls are employed chiefly in the manufacture of spectacles. The making of the light steel frames, now popular, and of the silver and gold frames, too, employs men and boys, while the grinding of the glasses and the fitting-up of the spectacles is frequently done by women and girls. Over 3,000 pairs of spectacles are made at Walsall weekly.

Agricultural Implements.—It is estimated that the iron consumed in South Staffordshire in iron fencing, farm gates, hurdles, and such like articles used for agricultural purposes exceeds 10,000 tons per annum, as upwards of 4,000 tons are consumed by one firm alone, and many other manufactories of similar articles have sprung into existence of late years in the neighbourhood of Wolverhampton and Bilston.

Commerce.

New System of Pickling Vegetables.—Some experiments have recently been made by Messrs. Burgess and Sons with some newly-invented machinery which that firm have erected for working Manfield's system for the preservation of vegetables. The novelty of the new process consists in its effecting in a few hours, by means of atmospheric exhaustion and condensation, that which has hitherto taken months to accomplish. The machinery consists of a large air-tight chamber or receiver, capable of containing 100 gallons of vegetables, fitted with two sets of air-pumps for exhausting and condensing the air in the receiver; an air-tight tank to contain vinegar communicates with the receiver, the whole of the machinery being worked by a Lenoir gas-engine. The metal parts of the machine with which the vinegar comes into contact have been made exclusively of platinum. The method by which the pickling process is attained is as follows:—The vegetables are placed in the receiver under atmospheric pressure; all superfluous moisture is expressed without in any way injuring them. The air is subsequently exhausted by means of the vacuum-pumps, when spiced vinegar is admitted and forced into the fibres of the vegetables by an atmospheric pressure equal to 45 lb. to the square inch, or about three ordinary atmospheres. When this operation is over, the pickles are found ready for the table. The patentee of this system of preserving does not claim the merit of having invented any new principle, as a somewhat similar plan has been used in creosoting railway sleepers; he merely claims the novelty of having utilised for practical purposes the well-known air-pump experiment of exhausting the air from a piece of wood and impregnating it with mercury. The method of pickling hitherto employed has been to cut up the materials and then simply cover them with hot or cold spiced vinegar, trusting to time for it to soak in, which process takes some months before the vegetables lose their

natural rawness, and acquire the desired flavour. This is the home-made plan, but it is said to be seldom employed commercially, as the wholesale manufacturer has often to keep hundreds of hogsheads of vegetables for months; and as the capital lost by keeping such a quantity in vinegar would be large, brine is the medium they are kept in until required for pickling; but as the strongest and best vinegar made is not sufficient to counteract the effects of the salt absorbed by the vegetables kept in that manner, acetic acid is used for the purpose of neutralising it, after which the pickling proceeds in the ordinary manner.

Steam Navigation in Norway.—The competition between the English and Norwegian steamboat companies, whose vessels run between Christiana and Hull, has given a great impulse to steam navigation in the first of these. Considerable cargoes follow each other each week at excessively low freights. Should this state of things continue for some time, it will have the effect of lowering the price of a great number of goods. There are weekly six vessels on the Christiana, Hull, Copenhagen, and Lubeck lines, to which have been lately added three steamers that run fortnightly between Christiana and Hamburgh, and between Christiana and London.

Gold Mining in Italy.—It cannot fail to be encouraging to those interested in the development of the Italian gold mines to find that the returns continue to increase gradually. Another remittance from the Pistarena, Vallanzasca, and Val Toppa mines has been received, amounting to about 1,357 ozs. of fine gold, of the value of about £4,400. The yield per ton of the Pistarena ore, treated during fifty-two days, has been over 2 ozs. of gold per ton of ore. This mine has now returned, since April 1st, upwards of £9,000 worth of gold.

Colonies.

Queensland.—The total imports for 1865 amounted to £2,505,559, which is an enormous amount, considering the smallness of the population, which clearly shows that the taxation of the colony was not very large, or so much would not have been imported. The total cash receipts, in 1867, are estimated at £847,540 from revenue proper—the actual expenditure would be £688,919. Considerable discussion upon the statement and the proposed tariff took place, the members representing town constituencies contending that the new duties would fall heavily upon the poorer classes and scarcely touch the squatters. Sugar-growing is making good progress in the colony of Queensland. An increased quantity of land is being planted on the shores of Moreton Bay, both at the Cabulture in the north, and the Logan, Albert, Punpana, and the Nerang rivers, on the south of the bay. At various places on the coast new plantations are being established. On the Mackay River alone there are six estates on which upwards of 160 acres are already planted, and ploughing was proceeding vigorously. On the Mary River some extensive machinery has recently been erected, the settlers there going into sugar-growing with a will.

Legislation in New South Wales.—A bill introduced into the Colonial Parliament to remove restrictions in distillation has been thrown out on its second reading by a majority of 22 to 17. Its object was to relieve the growers of Australian produce generally from disabilities under which they at present labour. At the present time the owners of vineyards may distil for the purpose of fortifying their wines to a certain extent, but they cannot bring into the market the spirit they produce, except in that way, and thus there is annually wasted a large quantity of produce which otherwise might be utilised. The Government objected to the measure, on the ground that it would destroy the revenue and lead to great demoralisation. But while they would not remove the restrictions to distillation in regard to the whole range of colonial produce from which spirit can be obtained, they were willing to make provision for allowing the wine-maker to place his surplus brandy in bond, and thus bring it into the market. A bill has been introduced by the Colonial Treasurer to permit the sale of brandy distilled by the owners of vineyards from grapes the produce of such vineyards. It was read a second time without opposition, and has passed through committee without amendment. Several very useful measures have been introduced by the Hon. Minister for Lands. One of these is to provide for the prevention and cure of diseases in sheep. Some years ago, as many as 300,000 sheep were diseased at one time. It was with great satisfaction, therefore, that the announcement was received not long since that the flocks of this colony were entirely free from scab. It is believed that by passing the measure now introduced, it will be possible to check the spread of diseases should they unfortunately again appear. A kindred measure relates to diseases in cattle.

Publications Issued.

The Illustrated Record and Descriptive Catalogue of the Dublin International Exhibition, 1865. By H. Parkinson and P. L. Simmonds. (*E. and F. N. Spon.*)—This work, which contains two hundred and fifty illustrations on wood, stone, and steel, photographs, &c., is published under the sanction of the executive committee, and is an elegantly got up volume, extending to nearly 600 pages. It comprises a large fund of important information on the industries of Ireland, and the progress made in manufactures since the first International Exhibition in that country. Besides special reports of the juries, there are valuable preliminary reports on the industrial, colonial, and fine arts departments by the several superintendents, and interesting sketches by gentlemen who visited different foreign courts to promote the objects of the exhibition. The statistical and general official information of the results of the exhibition, as compared with the different ones that preceded it, will prove of importance at the present time to all those officially engaged on the Paris Exhibition.

Little Experiments for Little Chemists. By W. H. Walenn, F.C.S. (*T. J. Allman.*)—This work is intended to give a systematic direction to those desultory chemical experiments which young boys so constantly delight in. Each experiment is most carefully detailed, and the most minute directions are given, in every case, for performing the experiment, followed by a description of the result that should be effected, and how it takes place. The work is thoroughly elementary and unencumbered with any but the commoner chemical terms. A lad thus becomes accustomed to dealing with chemical substances, and by the time he has gone through the book is in a favourable condition for commencing the systematic and scientific study of chemistry.

Histoire des Connaissances Chimiques. By M. Chevreul. Vol. 1. 8vo. Paris.—Anything coming from the pen of so celebrated a chemist as M. Chevreul is sure to command attention, and the volume of which the title stands above is the herald of a very important work, a complete history of chemical knowledge. M. Chevreul's object is the production of a solid and systematic work—not a popular one; and he has commenced his labour by a very complete introduction. This preliminary volume is divided into five books. The first treats of the general notions of natural philosophy, in which the writer makes known his own views respecting controverted theories and definitions; the second is a dissertation upon the province of chemistry; the third treats of the connection of chemistry with the history

of living beings; the fourth, and most remarkable, book presents a general view of the whole round of the sciences; and the fifth deals with man himself, as the constructor of the sciences, that is to say, on the methods by which his faculties have worked to that end. The volume, which is but the *avant-courier* of a great work, might almost have borne the title of the connection of the sciences.

Notes.

Paris Exhibition.—Among other speculations and novelties proposed to be sent to the Paris Exhibition from Brazil the following are named:—A large collection of Indian and other native weapons and utensils for the chase and fisheries, native dresses, the dried powdered flesh of the large native fish, much used as food, the *pisacura*, guarana, a kind of native chocolate, obtained from the fruit of the *Paullinia sorbilis*, and the trade in this, owing to a foreign demand, has, of late years, reached a large extension; specimens of paper, made from maize, bananas, and other indigenous fibres, of which the supply is unlimited; tucum, a fibre obtained from the leaf of a palm, much used for making hammocks; another fine and strong fibre, called curana, is much used for the same purpose, and especially by the Indians for the strings of their bows. It is obtained from a species of *Agave*, a plant allied to the pine-apple, and although very abundant, has yet no commercial value as an article of export. An extract of Paraguay tea is now used in place of the yerba, or powdered leaves and branches of the tree. Dr. Ubatuba, who prepares this, has also given his attention to an *extractum carnis*, by a process of his own, which he is carrying out on a large scale, and which is said to be preferable to and cheaper than that adopted in Uruguay. From Bahia there will be sent a collection of 104 specimens of barks suited for dyeing and tanning. Local exhibitions have been held in the chief towns of all the provinces of the empire.

Subscriptions in aid of the Sufferers from the late Floods in France.—The subscriptions collected for the relief of the most necessitous sufferers from the late inundations throughout France amounted at the end of last week to 3,221,155 francs, or £128,846. This is a large sum considering the many demands that have of late been made on the charity of the nation, and the losses that have been sustained by the failure of the silk crop, the sad condition of the silk trade, and the devastations of the locusts in Algeria; the lists are not yet closed.

The Orphan Asylum of the Prince Imperial.—The annual report of this valuable institution, which has been described in the columns of the *Journal*, has just appeared, and shows what valuable service it has done for the poor children of Paris. Since its creation the directors have received contributions from private persons to the extent of more than £12,500, the subscription during the past twelve months alone having exceeded £1,200. The augmentation of the revenues of the Orphélinat has allowed the council to extend its benefits, and 99 children have been admitted since November, 1865; of these more than one-third were made orphans by the cholera; the Empress, having visited the hospitals of Paris, expressed a desire that the doors of the asylum should be open to all the male children whose parents were victims of the epidemic; a committee was charged with the duty of collecting the necessary funds, and seeing the wish of the Empress accomplished. The object of the institution is first to instruct orphan boys, and afterwards to place them to learn a trade, and watch over them until they are of an age and in a condition to take care of themselves. Since the establishment of the asylum, ten years ago, more than five hundred children have been admitted, and although they were the offspring of parents who, in most cases, died early, either from weakness of constitution or overwork, there have only been thirty-one deaths; during the current year, out of 335 pupils and dependents on the institution, there have been but three deaths, which is evidence of the sanitary condition of the establishment. The maximum age of admission is limited, in practice, to eight years, and the actual average age is seven years eight months. The trades to which the lads are apprenticed are principally those of the cabinet maker, blacksmith, shoe maker, tanner, engraver, watch maker, printer, and engineer; eleven pupils out of the whole number sent out of the school into the world have preferred the army and navy. Twenty-four children were admitted into the asylum the other day on the occasion of the Empress's birthday. It will be seen that the asylum is not yet a large establishment, but it is an admirable institution, and will doubtless go on increasing in importance and usefulness.

Correspondence.

Limited Liability.—Sir,—Having been present at the reading of Mr. W. Hawes' paper on the 28th ultimo, "On the effect of Limited Liability on Commerce," and heard part of the discussion thereon, allow me, as a former mercantile man, to state my ideas of the cause of the disastrous results of many useful undertakings. 1. In the declaration of railway dividends, instead of making the capital £100 to vary with the small differences in dividends on this very magnified scale (*i.e.*, if we couple 5 per cent. with £100, 8 per cent. marks £160, 10 per cent. is £200, 4 per cent. is £80), which has been one great cause of changes in fortune, it would have been far better to declare £5 or £6 per annum the interest on the original £100 subscribed, and give the extra dividend as a return of part of the said £100, thus:—The original holder receives £8 per cent.—that is £6, and £2 back—£98 remains; the £100 share is now only £6 per annum and £98 to be returned; at 9 per cent. dividend (or £3 above £6) remains £95 and £6 per annum; at 10 per cent. dividend (or £4 above £6) remains £91 and £6 per annum; thus, granting a stability in the price of this first-rate investment for the small savings of the middle classes. For *primâ facie*, what ought to be securer than land and houses, and ready money business, passengers' fares, &c.? Also Parliament should only consider whether the capital laid out in a novel undertaking is too exhaustive; thus, *e.g.*, had the Liverpool and Manchester Railway been for ten millions of pounds per statute mile, this should have been rejected; but as the total for 30 miles was only £800,000, which might be the damage to our war or mercantile marine afloat in a great hurricane—this amount expended on land in this country should not have met with opposition, in consideration of the probable uninterrupted communication during the whole year, and new methods of field-draining, quarries, &c., that might be discovered, independently of the creations of genius which Parliament cannot direct. 2. As regards the banks, one fruitful cause of distress is the destruction of the salutary control exercised by the honest and capable banker and bill broker. Formerly, the foreign merchant got his bill discounted by the said broker, say at $\frac{1}{4}$ per cent. under the Bank of England current rate, and the said broker rediscounted it at $\frac{3}{4}$ per cent. under the bank current rate to the capitalist, who kept it till it was due. If paid, another amount was taken by the broker from the merchant; if not, the credit of the latter was diminished, if not stopped. Now, to save these little per-centages, merchants are directors of joint-stock banks; the partner of a firm and director of a bank tells his brother directors "they may safely discount for ten times the old

amount presented by the firm;" and if the speculations of the firm turn out unsuccessful, we have widespread ruin, and the goods assets of the firm are bought at a reduced rate by others, who would otherwise have gone to the regular producers. It has happened too often that the bulk of the joint-stock bank capital has been lent to one house alone. 3. The manager of a private partnership of a few partners can say to them, "I have only made 7 instead of 12 per cent. of your capital this year." They will reply, "We manage to live at the rate of 6 per cent., so that we are not losers, and approve of your caution." But the joint-stock manager, who has so many little shareholders to please, with their £20, £30, £50, and each with a vote, knows these men will not be satisfied with a reduced rate, having once launched into the luxuries which a 10 or 12 per cent. dividend will give them. And, in fact, the 15 per cent. dividend is generally made up of the legitimate 5 per cent. on capital subscribed, and the 10 per cent. turn of the market on the tenfold deposit amount. 4. In undertakings such as the Great Ship Company, which came out in £1 shares, is it not commercially absurd to intrust such a vast professional structure to the fostering care of petty tradesmen, who know nothing of the technicalities of the shipbuilding and shipowning trade, instead of seeking at least £100 shareholders? In Prussia, there is an official director attached to the company's board, to see that the other directors do not extravagantly squander the shareholders' money; also an official executor to every estate, who receives from the family executor the realised assets, and takes charge of them for the minors and absentees—similarly to our Accountant-General in Chancery, but with much less expense and circumlocution. Had proper unanimity been observed, and a uniform charge of 3d., 2d., 1d. per mile established, we would not have in provincial towns competing railway lines running for miles close to each other, and with separate stations, involving expense and trouble for passengers and goods in traversing a short distance in a country town to go on another line of rails (*e.g.* Leamington). Would it not be better for the working classes to establish streets of three-floored houses within a walking distance of their workshops, than to tempt them by daily pennyworths of railway ride, which in hard times would have been found some little alleviation of distress? I would respectfully but strongly recommend that the small insurances from £50 to £100 on tools and furniture should be favoured, especially for the young and newly-married workmen. The premium, even loaded with Government duty, would only require them to keep quietly at home one or two Sundays in the year instead of spending the same amount of Government duty in taxes on beer and gin. In case of fire, &c., they would get their cash to replace their furniture, instead of going to the tally-shop; which is not so urgent for the elder class of workmen, who have their £100 or £150 in the savings-bank at hand in case of a calamity by fire or water. I have just jotted down these few ideas which have been many years present to my mind, as effectual remedies against some of the disasters that unlimited reliance on shareholders' capital has produced. Thus, if a Rothschild leaves at Jones Loyd's a balance of £500, and a little Mr. Smith £2,000, Jones Loyd traded on £2,500; but in a joint-stock company the manager trades on the Rothschildian millions and the Smithian thousands—the key of subsequent ruin to all shareholders.—I am, &c., S. M. DRACH, F.R.A.S., &c.

MEETINGS FOR THE ENSUING WEEK.

MON. ...Medical, 8.
THUR ...Mathematical, 8.
Royal Inst., 3. Professor Frankland, "On the Chemistry of Gases." (Juvenile lectures.)
SAT. ...Royal Inst., 3. Professor Frankland, "On the Chemistry of Gases." (Juvenile lectures.)

Patents.

From Commissioners of Patents' Journal, December 14th.

GRANTS OF PROVISIONAL PROTECTION.

Animal charcoal, treating—2571—G. Gordon.
Animals, clipping—2796—P. Adie.
Brushes—2861—M. Chamberlain.
Chloride of lime—2467—W. Neill, jun., and P. Smith.
Earthenware—3120—J. H. Atterbury and S. Woolf.
Elastic fabrics—2772—A. Turner.
Emery and glass cloths—2911—R. J. Edwards.
Engines, lubricating—2925—A. Gobert.
Fabrics, printing—2719—F. Petitdidier.
Floors, coverings for—3007—J. H. Johnson.
Furnaces, &c.—3122—T. Dickins, H. Heywood, and J. Holland.
Harbours—2999—T. B. Daft.
Harness, saddles, and tugs—3132—H. Langsford.
Impermeable mastic compositions—3130—W. Clark.
Incubators—3144—F. la Moile.
Infants and invalids, a concentrated milk for feeding—3142—E. V. Lersner-Ebersburg.
Iron upon iron, welding—2341—B. Lietar.
Iron with zinc, coating—3118—G. Crockford.
Ladies' skirts—3009—A. V. Newton.
Life rafts on board ship—3013—J. W. Hurst.
Local anæsthesia, producing—3011—R. Woollatt.
Locks—2987—W. Clark.
Magic cameras—3116—A. Fournet and O. Nadaud.
Metal bands, connecting the ends of—2991—H. Lampson.
Photograms, obtaining—2939—T. Skaife.
Photography—2997—L. Bernieri.
Pianoforte strings, regulating the tension of—3134—G. Haseltine.
Power looms—2993—W. N. Atkinson.
Reaping and mowing machines—3050—J. Howard & E. T. Bousfield.
Reaping machines—3128—R. Norfolk.
Ships' boats, putting out—2919—W. Cassap.
Slide valves—3017—C. W. Dixon.
Steam generators—2989—W. A. Lyttle.
Substances, drying—2913—A. Giles and T. Sturgeon.
Syphons—3140—T. W. Plum.
Tubes, forming the joints of—3136—L. A. Fargon.
Vehicles, apparatus for indicating the time and distance travelled by—3124—W. Clark.
Vessels, closing—3005—G. Davies.
Weaving, looms for—3003—J. Sellers.
Wire-blocks, driving—3138—G. Crossley.
Yarns, wringing—2995—J. Nichols.

INVENTION WITH COMPLETE SPECIFICATION FILED.

Boots and shoes, pegging—3237—G. Haseltine.

PATENTS SEALED.

1630. W. Robertson & J. G. Orchar.
1639. J. E. T. Woods.
1642. A. Paraf.
1645. A. D. Renshaw.
1653. A. Bowen.
1657. J. Moller.
1670. T. Whitby.
1671. E. Peyton.
1672. W. and W. T. Eades.
1718. J. Baker.
1736. W. Clark.
1744. J. Jackson.
1778. C. Doughty.
1867. C. and S. A. Varley.

From Commissioners of Patents' Journal, December 18th.

PATENTS SEALED.

1646. F. J. Bolton.
1647. T. Blatch.
1654. D. A. Fyffe.
1658. J. Abbott.
1659. W. Forgie and J. Thornton.
1660. L. Hart.
1664. W. Smith.
1667. E. Hunt.
1668. C. A. Dufour.
1677. T. Dunn.
1680. A. Lee.
1693. G. Charles-Ange.
1703. W. R. Lake.
1715. J. Henshall.
1727. S. C. Lister.
1735. J. Imray and J. Ellis.
1862. T. Westley and T. R. Beaumont.
2002. G. W. Fair.
2027. W. R. Lake.
2138. G. Haseltine.
2387. D. McDowell.
2522. J. Whitworth.
2539. J. R. Swann.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

3144. R. Saunders.
3128. N. Walton.
3129. J. Cliff.
3137. J. Townsend.
3175. J. Hindle, W. F. Calvert, and E. Thornton.
3161. H. B. Sears.
3205. F. W. Collins.
3195. W. B. Adams.
3206. W. E. [illegible]edge.
3238. W. E. Gedge.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

2828. J. R. Johnson and J. S. Atkinson.
2814. J. R. Breckon & R. Dixon.
2831. W. Robinson.
2832. S. C. Lister and J. Warburton.
2839. G. Leach.
2846. G. Hawksley.
2838. G. Bedson.
2900. W. Henderson.
70. W. Cotton.
2867. R. Morrison.

Journal of the Society of Arts.

FRIDAY, DECEMBER 28, 1866.

Announcements by the Council.

Cantor Lectures.

The following is the syllabus of the course of Six Lectures "On Pottery and Porcelain," illustrated by specimens of various manufactures, and by photographs and diagrams, to be delivered by William Chaffers, Esq. :—

Lecture I.—Monday, January 21, 1867.
Ancient Pottery.—Introduction. Assyria and Chaldea, Egypt, Greece, Etruria, Rome, &c.

Lecture II.—Monday, January 28.
Maiolica.—Italy, Spain, Persia, &c.

Lecture III.—Monday, February 4.
Fayence.—France, Spain, Portugal, Russia, Sweden, Denmark, &c.
Grès or Stone Ware of Germany and Flanders.
Delft Ware, &c.

Lecture IV.—Monday, February 11.
Oriental Porcelain.—China, Japan.

Lecture V.—Monday, February 18.
European Porcelain. — Italy, Germany, France, Holland, Belgium, Russia, Poland, &c.

Lecture VI.—Monday, February 25.
English Pottery and Porcelain.—Early History, continued to the beginning of the 19th century.

The lectures will commence each evening at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend to each lecture.

A new list of members of the Society has been printed, and any member can have a copy sent to him on application to the Secretary.

Proceedings of Institutions.

Manchester Mechanics' Institution.—The distribution of the prizes, medals, and certificates to the students in classes at the Manchester Mechanics' Institution at the last examinations of the Department of Science and Art, the Society of Arts, and the Union of Lancashire and Cheshire Institutes, took place on the evening of the 14th December, in the lecture-hall of the Institution. Mr. Oliver Heywood, the president of the Institution, occupied the chair, and there were also present—Mr. T. Bazley, M.P., the Mayors of Manchester and Salford, the Rev. Canon Richson, Mr. W. Fairbairn, LL.D., Mr. Thos. Lawton, visiting agent to the Union of Lancashire and Cheshire Institutes, Mr. H. R. Forrest, Mr. D. Fielden, Mr. J. Plant, and others. There was a very large attendance. Letters of apology were received from the Right Hon. H. A. Bruce, M.P., Mr. James, M.P., Mr. Cheetham, M.P., and Mr. Alderman Rumney. Mr. Jarrett, the secretary of the Institution, read a statement of the number of successful candidates at the several examinations, and of the prizes awarded. He stated that, at the examination of the Department of Science and Art, 153 candidates presented themselves, of whom 102 were successful. There were 25 first class, 21 second class, 59 third class, 23 fourth class, and 46 fifth class, making a total of 174 certificates of honour gained; last year the total was 293. Two silver and two bronze medals were also awarded at the last examination. At the Society of Arts examination 62 candidates presented themselves, of whom 48 were successful. Certificates were awarded as follows:—8 first class, 26 second class, 23 third class, making a total of 57; last year the total was 63. Mr. John Peiser, one of the vice-presidents, had intimated his intention of giving a sum of £5, to be awarded in three prizes, to the students most successful at the next examination in book-keeping, the class which Mr. Peiser is desirous to encourage. At the Union of Institutes examination, 41 candidates presented themselves; 19 in the higher grade, of whom 13 were successful, and 22 in the lower grade, 13 of whom were successful. Three of the higher grade students obtained prizes offered by the Union, in addition to certificates. In connection with the next Society of Arts examination, the president will continue his prizes of £5 and £3 each to the two students whose aggregate success for the years 1866 and 1867 shall be greatest; Mr. Leppoc repeats his £5 prize to the first-class candidates in arithmetic; and Mr. Peiser, as before stated, offers £5 to the pupils in the book-keeping class. Mr. Alderman Rumney again presents a prize of £5 to the most successful students in the science classes; and the president will give two prizes of £1 each to the two best candidates at the next Union of Institutes examinations. —The chairman having distributed the prizes, proceeded to deliver a very appropriate and effective speech, in which he dwelt upon the past history, and future prospects of the Institution, and summarised the educational efforts which had been made during the past few years. He specially alluded to an important meeting on the subject of compulsory education which had been held in the Town Hall on the previous Monday.—Mr. T. Bazley, M.P., moved a resolution declaring that the system of examinations as conducted by the Department of Science and Art, the Society of Arts, and the Union of Institutes, was conducive to the progress of general education, and therefore deserving of approval and support. He had been very much gratified with the conduct both of the successful and unsuccessful students. He remembered that his friend, Mr. Fairbairn, 40 years ago, was instrumental, in connection with the late Sir Benjamin Heywood, in calling into existence this institution; and Mr. Fairbairn had given another impulse to the cause of education by advocating with eloquence and with pecuniary power the formation of an engineering professorship at Owens College. After remarking upon the advantages of education to the young, and the necessity of freely providing it to the children of the very poor, he combated the worthless objection, as he considered it, to free education, that it was degrading to the parents of the children to whom it was extended, by reminding them that the principle of free education was at the foundation of our universities and public schools. The people of the Continent and of America were in advance of us in this respect, and set us an example which we ought to follow. The Mayor of Manchester briefly seconded the resolution, which was supported at some length by the Mayor of Salford, and unanimously carried. Mr. W. Fairbairn moved a vote of thanks to the donors of the special prizes. Mr. Forrest seconded the resolution, which was carried unanimously. On the motion of the Rev. Canon Richson, a vote of thanks was given to the president, and the proceedings terminated.

OPENING OF THE INTERCOLONIAL EXHIBITION.

This Exhibition was formally opened at Melbourne by his Excellency the Governor on the 24th October last, in the presence of a large concourse. The first of these gatherings took place in 1854, anticipatory of the Paris

Exhibition held in the following year. It was a creditable display for the period, a light structure of wood and glass having been erected for the purpose. The collection of articles constituted, however, rather a bazaar than an exhibition, most of them having been supplied by fancy goods men and general importers. Native produce was but poorly represented, and out of the entire list of exhibitors only thirty-six were in a position to contribute to the Australian court at the Paris international gathering. The Exhibition held in 1861 was a great improvement on its predecessor, the articles exhibited of local growth and manufacture being numerous and interesting. The building constructed in 1854, with the addition of an annexe nearly as large as itself, was used on this occasion. It resulted in the Victorian court achieving a proud position at the International Exhibition of 1862. These two events, however, though notable in Melbourne annals, sink into insignificance when compared with the magnificent undertaking which was recently inaugurated. Both in conception and execution this third Exhibition stands out as a grand and peculiar one. For the first time, the various colonies of Australasia meet in friendly competition at an independent gathering. It had been many months in preparation, and the interest attaching to it gradually increased, as exhibition after exhibition, in preparation for the central one, has been held in the large provincial towns of Victoria and the capitals of the neighbouring colonies.

The Commission nominated for the purpose was appointed a year ago. It was speedily perceived that the structure which had served for the previous exhibitions would be utterly inadequate to accommodate the collection which the various colonies might be expected to bring together; and one of the first important acts of the commission was to decide on uniting with the trustees of the Public Library in erecting an edifice worthy of the occasion, and suitable for the requirements of a museum after the temporary purpose had been served. It appears, however, that only the foundations and lower walls of the great hall and octagon are permanent; the superstructure is of wood, and the beauty of the interior is solely owing to its large size and to the elegant decorative colouring which has been laid upon it, under the superintendence of Mr. E. T. Bateman. The buildings occupied by the Exhibition consist of a great hall, a spacious octagon leading to it from the Public Library, two open-air courts on each side of this octagon, a northern wing containing the machines, a southern wing devoted to the pictures, and a large iron annexe, entered from the central hall by a short covered way. In addition to these there are the unoccupied portion of the garden in the rear of the building, the basement underneath the picture-gallery, set apart chiefly as dining-hall and refreshment-rooms, but also with cellars devoted to the exhibition of preserved meats, wines, beers, &c, of which there is a fine collection.

At the date originally fixed by the commission as the limit for the receipt of applications for space, very few had come in; it therefore became necessary to extend it from time to time, until at length applicants became almost more numerous than welcome, and the decided success of the undertaking was assured. This lateness of entry, however, has led to some confusion, both as regards position in the rooms and accuracy in the catalogues.

A few minutes before twelve, so complete were the preparations, that Mr. J. G. Knight, the secretary to the commissioners appeared with bound copies of the "Exhibition Catalogue." As noon struck the vice-regal party arrived. His Excellency, Lady Manners Sutton, and family appeared at the entrance communicating with the Public Library, and proceeded to the daïs, and at the moment the band and chorus of 300 performers commenced the National Anthem. As it concluded Sir Francis Murphy, the acting president of the commissioners, stepped forward and read an address, in which, after the warmest expressions of loyalty to Her Majesty, the commissioners proceeded as follows:—

"By the munificence of Parliament we are now assembled in a hall unequalled in the Southern hemisphere, and which, for extent and accommodation, as well as excellency of workmanship, will, when finished, be a lasting monument of the public spirit of our Parliament and the enterprise of our people. A report in detail of our proceedings will be laid before you, together with essays illustrative of our great national resources and of the social condition of the country, freely contributed by some of the most eminent men in our community. It is also our duty to inform your Excellency of the cordial manner in which this Exhibition has been supported by all classes in this country, and of the intelligent help which we have received from the manufacturers and workmen of every kind, to whose practical and generous efforts we are indebted for much of our success. We congratulate your Excellency on the arrival among us of representatives from New Caledonia, being part of the dominions of His Imperial Majesty the Emperor of the French; and also of the important city of Batavia, part of the dominions of His Majesty the King of the Netherlands, bringing to us the products and manufactures of their respective countries, and pledging themselves to a friendship and brotherhood in the objects of this undertaking. We further show to your Excellency that by the public spirit, intelligence, and industry of our sister colonies, we have gathered within these walls a collection of natural products proving the richness of their industrial resources, and a collection of works of art, manufactures, and machinery exhibiting the genius of their artists and the enterprise and the skill of their workmen, contrasting in friendly competition with our own—all being suggestive of a future time when the Australian colonies will be great and prosperous states, rivalling European kingdoms in all that is worthy of rivalry, and bound together by a united and loyal affection towards the British crown, as well as by the blessings of industry and peace. We earnestly hope that this Exhibition may be as productive of increased intercourse, of friendly relations, and of all the industrial advantages among these southern colonies, as exhibitions of a similar kind have been among European nations; being an additional proof, even in these southern seas, of the forethought and sagacity of the good and illustrious Prince Albert, whose memory will be ever revered, and associated with exhibitions of industry and art."

The report of the Organisation Committee was also handed to the Governor. From this document it appears that the great hall of the building is 220 feet in length and 82 feet in breadth, containing 17,000 superficial feet; the rotunda, 3,000; the north and south wings, 4,250 superficial feet each. Owing to the numerous applications for space by the intending exhibitors, the buildings were found inadequate to meet the demand, and it was therefore deemed advisable to erect the eastern annexe, containing 7,800 superficial feet, and even subsequently to increase its size by 3,000 superficial feet, giving a grand total of 38,500 superficial feet. The objects for exhibition were divided into six great classes:—Mineral products, animal products, agricultural with horticultural and indigenous vegetable products, manufactures and the useful arts, the ornamental arts, and machinery.

A fine collection of specimens of precious stones has been brought together through the energy of the Rev. Dr. Bleasdale. The banks in Melbourne have contributed valuable specimens of the precious metals, whilst from the various mining districts beautiful collections of quartz intermixed with gold have been forwarded. A pyramid is shown illustrative of the quantity of gold produced in Victoria from the year 1851 till a recent date. This structure is intended for transmission to Paris. There is a fair collection of samples of wool; and the local exhibitions held since harvest, assisted by the

agricultural societies of Victoria, have afforded an opportunity of obtaining the best and most varied samples of grain. Australian wine is well represented; and the specimens of indigenous woods, and their products, collected by Dr. Mueller, deserve particular attention.

Products from the exhibitions held at Ballarat, Sandhurst, Castlemaine, Beechworth, &c., have separate courts allotted to them; and complete collections have been presented from the districts of Wangaratta, Duncolly, Clunes, St. Arnaud, and others. The sister colonies—New South Wales, Queensland, South Australia, Tasmania, and New Zealand, are worthily represented by most complete collections of their various products and manufactures.

The north wing has been set apart for the arrangement of various kinds of machinery; and three engines, of twenty, sixteen, and four horse power each, are erected in the adjacent court, to afford motive power. The south wing is intended for the exhibition of paintings. In the open courts are fountains of the most beautiful and novel descriptions, which will add much to the success of the flower shows intended to be held from time to time, and arrangements for which have been made with the Horticultural Society of Victoria. Pipes from the Yan Yean Water Reservoir have been laid all over the buildings, so as to allay all apprehension of accident from fire.

In the eastern annexe will be found carriages of all descriptions manufactured in Victoria.

Much information, in the form of essays, has been provided by gentlemen in public departments, and ordered for publication; and it is intended that these works shall also be published in the French language. Mr. Brough Smyth, of the mining department, has furnished a description of the mineral resources of the colony. Professor M'Coy, professor of natural science in the University of Melbourne, makes a report upon recent and fossil zoology. Mr. Selwyn, government zoologist, has presented an elaborate treatise on the physical geography, geology, and mineralogy of Victoria. Dr. Mueller, scientific botanist, a varied essay upon botany and the general vegetation of the Australian continent. Mr. Ellery, the Government astronomer and director of the meteorological department, gives an interesting description respecting the atmospheric changes of the climate and other observations made at the Melbourne Observatory. Mr. Archer full statistics of the colony.

Lists of jurors were in course of preparation, and a medallion has been designed, which it is intended to attach to a handsome decorated card to be presented to those considered worthy by the jurors of this distinction.

His Excellency, having made a suitable reply, congratulating the commissioners on the success of their efforts, declared the exhibition open.

The musical part of the ceremony now began. First was sung the Old Hundredth Psalm, arranged for the occasion by Mr. Horsley. Handel's Hallelujah Chorus followed, and the performance concluded with a grand march composed by the conductor for the occasion.

The inauguration being now over, cheers were heartily given for the Exhibition, the Queen, and the Governor. Up to the latter part of the afternoon, 1,737 persons holding season tickets passed through the doors.

EDUCATION IN FRANCE.

The cause of education, general as well as special, and for youth as well as for adults, is being aided as much as possible by public distributions of prizes and honours in various parts of France. One of these public meetings was held the other day at Privas, in the Ardèche, when the clergy of both denominations, magistrates, public functionaries, and members of the *Conseil-Général* of the town and of the department, and 200 schoolmasters and mistresses were present. The prefect addressed the meeting, and presented, amidst the cheers of the assembly, the Cross of the Legion of Honour to M. Manson, a public schoolmaster of Vernoux. At Mont-de-Marsan there was also a large gathering at the invitation of the Prefect of the department; M. Guillontet, deputy, presided, and, amongst other things, made allusion in his address to the new school of secondary special education, just inaugurated in the town. "Special education," said M. Guillontet, "responds to a pressing necessity; in past times the State favoured the education of the upper classes, which alone could attain it; now, and in future, it aims at the teaching of the greatest possible number; this is its duty, because the places which heretofore were reserved for a few privileged people are now open to all the world. In a society like ours the democratic level, having effaced the differences which existed between the military and the manufacturing classes, between the magistrate and the farmer, between the advocate and the tradesman, the development of industry, agriculture, commerce, and speculations of all sorts, opens to human industry a wider field than that of public employment and the learned professions. . . . The Government has comprehended and well fulfilled its duty, and, certainly, the result which will accrue from the new organization of public instruction will be one of its noblest achievements." A teacher named Ducasse was then invested with the new decoration of an Academic Officer—the palm branches—and returned thanks on behalf of himself and his fellow teachers for the sympathy extended to them by the authorities of the department. The Prefect of the Loire also presided at a similar meeting at Saint Etienne, and was supported by the *conseils* and other bodies, public officers and teachers of the department. Here, also, the Academic palms of the rank of officer were bestowed on M. Delorme, professor of design in the Lycée, for his gratuitous exertions during five months in improving the education of eighty foremen of works. The director of the Ecole Normale, the inspectors of primary education, and the prizemen of the adult classes, were afterwards entertained at dinner by the inspector of the Academy. At Constantine, in Algeria, the public distribution of awards occurred on the last day of September, under the presidency of the general of division commanding the province, assisted by the councillors and public officers. The inspector of primary instruction reported the results of the past scholastic session with respect to adult education. Out of 1,204 persons who attended the classes 286 could neither read nor write, and 143 could read only; at the end of the session 104 who had begun without any education could read and write, and 46 others could read with tolerable facility. Of the others they had all either improved themselves in what they had learned before or acquired new attainments. Some of the students had, in spite of bad roads, walked many miles to the school and back every evening. The municipal council of St. Ismier, in the Isère, voted a hundred francs in aid of the teacher of the adult classes, M. Hermite, but this worthy master refused to accept the money, but desired it to be devoted towards the expenses of the new school now in course of erection.

The *Conseil-Général* of the department of the Oise has decided on the organization of an inspection of the labour of children in the factories of the department, and has recommended that this duty be performed by the inspectors of the common schools, voting, at the same time, an allowance of 1,200 francs to be divided amongst the inspectors in proportion to the services performed.

COMMERCE AND CURRENCY.

The *Produce Markets Review*, in an article on the currency question, after speaking of the differences of opinion that have existed on this subject, says:—

"At the present time there is, it seems, so far an approach to a common ground or partial assimilation of views, on the part of the mercantile world, that a re-

stricted currency is supposed to be more or less associated with those periodical financial crises for which it is so difficult to discover a remedy. It may not be amiss, therefore, at the present moment to inquire how far our system of currency has kept pace with the vast extension of our commerce during the period of seven years, commencing with the year 1858 and ending with 1864, the last year for which correct official returns can be obtained. The comparison would have been still more complete had it been carried back for ten, fifteen, or twenty years; but as no imports of specie were registered at the Custom-house previously to the month of October, 1857, it is evident that no calculations could be considered as complete which should exclude from consideration so important an element as the imports of gold and silver coin. The total value of our exports and imports, in other words, of our external commerce for the year 1864, amounted to £487,571,786, against £304,366,611 in 1858, showing an increase for 1864 of £183,205,175, or of rather more than 60 per cent., in our foreign trade. Although it is impossible to give even relative figures for the increase in our internal trade, it must have augmented in quite as large a proportion as our foreign trade. In addition to these causes for an increased demand for currency, it will be remembered that weekly wages have universally risen of late years; and as they are paid in actual coin, the greater demand from this cause alone must be considerable. To estimate approximately the increase in our currency, we must add together our coinage and imports, deducting all exports:—

The Gold and Silver coin, issued from Mint, from 1858, to 1864..	£41,929,364
Add Imports of British Coin during the same period	£8,026,423
	£49,955,787 (a)

From this we must deduct the value of the exports of British coin, the value of the worn coin, re-coined, the decrease in Bank-note circulation, and the money exported by emigrants to British colonies, and by other travellers, during this period of seven years, a large portion of which would not come back: thus, then, we get

Exports of British Coin, from 1858 to 1864.....	£32,137,304
Worn Coin recoined in same period	699,003
Decrease in Bank-note circulation	341,218
Money exported by 1,110,000 emigrants, and by travellers, say ..	5,000,000
	£38,177,922 (b)

Deducting (b) from (a) we get as a result an increase of nearly £12,000,000 in our currency; whilst our external commerce alone was £187,000,000, or more than 60 per cent. greater. There can be no doubt, in fact, that the increase in currency for many years past has not kept pace with the advance in trade. In answer to this, it may perhaps be urged that by means of cheques and bills and the clearing-house system, the rapidity of our circulation has so much increased as to meet all the requirements of trade. This is undoubtedly the case in ordinary times; but it is on the approach or during the existence of a panic that the real trial occurs, for then cheques, drafts, or bills become partially useless, and the demand is almost general for notes and coin. The serious nature of the issue raised may be gathered from the statements made in Mr. J. B. Smith's recent pamphlet on the currency, that the Bank of England and three other joint-stock banks had, at the beginning of last May, only £8,065,080 of cash in hand, against liabilities of £87,913,182. It is true they hold securities, but in times of panic even Consols are unsaleable. This state of things is most serious, and unless steps are taken it must inevitably become worse, because trade must continue to increase while the supply of gold and silver cannot augment in the same proportion, and the issue of notes is limited by law. The banks, from their constitution, must continue to lend money out; financial crises will recur with greater frequency, and if at any time confidence is shaken in the main sources of money supply, such as our large banks, the results must be disastrous. A craft that can sail in smooth water only, and is unable to survive the perils of a storm, is after all but a poor specimen of naval ingenuity. Our currency ought to be sufficiently elastic to expand or contract with the demand, and if this cannot be done with a gold medium, additional recourse must be had in times of pressure to the safety-valve of notes. To cure the evil, various remedies have been proposed; the Bristol Chamber of Commerce, and the Currency Reform Association, suggest the desirability of removing the issue department from the control of the Bank of England, and substituting a National Bank of Issue, "independent of trade and the Government." Without pretending fully to discuss the various issues to which this arrangement might lead, we may remark that the impossibility of adequately performing the functions of banking and issuing has been frequently dwelt upon by many of our ablest financial authorities. 'It is a serious difficulty,' observed a writer in the *Economist*, two months ago, 'that the same bank which keeps the ultimate reserve should also have the duty of lending in the last resort. The two functions are in practice inconsistent—one prescribes keeping money, and the other prescribes parting with money, and no ingenuity can in critical situations fulfil both.'"

Fine Arts.

Exhibition of the Works of the late Hippolyte Bellangé.—The collected works of Bellangé are to be exhibited in February, in the rooms of the Ecole des Beaux Arts in Paris; and after the exhibition, the sketches of the artist and such pictures as belong to his family will be sold by public auction. Bellangé's last production, "The Guard Dies but never Surrenders," which the artist touched while on his death bed, but which remains still unfinished, is amongst the relics to be sold. It is a remarkably fine specimen of the painter's style, in spite of its incomplete condition, and formed a most attractive object at the Paris Salon this year.

Annual Meeting of the French Academy of Fine Arts.—The annual public meeting of this Academy was held a few days since, and was crowded as usual. The principal business of this meeting is the announcement of prizes awarded, and of the subjects selected for future competitions; one of the Trémont prizes, of 2,000 francs each, was awarded between MM. Mathieu and Lecomte Dunouty, painters, and the other to M. Vogel, composer of several operas, including the "Siège de Leyde," and the "Moissonneuses," performed at the Théâtre Lyrique. M. Vogel, finding little demand for great operas, produced, not long since, an opera buffa for the smallest theatre in Paris, the Folies Marigny, in the Champs Elysées, and the President expressed a hope that the prize awarded to him would enable him to surmount the difficulties which stood in his way, and give his attention to works of a higher character. The Lambert prize of 1,300 francs was given to M. P. Nauteuil, painter, to aid him in overcoming difficulties in which he had fallen, in consequence of his father's death. The Deschaumes prize of 1,500 francs, founded to aid young architects without fortune, who have relatives dependent on them, was divided between M. Marcel Boisvert, and M. Méquer. The latter artist was, at the age of twenty-six, a workman in a factory, when his arm was broken by machinery; the limb was incompletely cured, and he was compelled to seek a new occupation; he studied architecture, while getting his living by writing, and afterwards obtained employment as conductor in the department of the Ponts-et-Chaussées, and supported his mother and sister. The prix Leclère was awarded to M. Dutert, architect,

for a design for a monument commemorative of the visit of the Emperor to Algeria. The subject proposed for the same prize next year is "a monumental bridge, situated in the midst of a great city, at the point of an island, magnificently decorated, and presenting an edifice consecrated as a souvenir of a universal exhibition of industry." These terms accord exactly with the position of the Pont Neuf, which touches the point of the island of the old city of Paris, where stands the equestrian statue of Henri IV., and the rebuilding of this bridge, and of the quaint old triangular Place Dauphine, once a court quarter of the town, has long been under consideration. Seven treatises were sent in for the Bordin prize, the subject being the teaching of sculpture amongst the Greeks and modern nations, and the Academy marked its appreciation of the value of these works by multiplying the prizes; that of 2,000 francs was given to MM. Louis and René Mesnard, joint authors; a second prize of half that amount to M. Henry D'Escamp, and honourable mention to a third treatise. The subject for the Bordin prize next year, as already announced in these columns, is the effect of national circumstances, politics, morals, and religion on the Beaux Arts; and for 1868 the analogies and differences which appear between Greek and Roman architecture; the authors being instructed to point out, either on the evidence of facts, or by deduction, what artists and artizans contributed to the construction and decoration of the public and private edifices either of Greece or Italy, and what was the civil and social condition of such artists and artizans. The business of the meeting terminated with an historical notice, by M. Beulé, of the life and works of the late sculptor, Francisque Duret, producer of the well-known "Neapolitan Dancer," in the Luxembourg Gallery, "The Improvisatore," the statue of Rachel in Phèdre, and of many other fine works.

Manufactures.

Agricultural Machinery in America.—Mr. James Howard, in a paper on this subject, recently read before the Farmers' Club, says:—"In England, as you are all aware, an enormous demand has set in during the last twenty years for improved agricultural implements. This has mainly arisen from a more correct appreciation of the value and advantages of good machines. In America, owing to the high rate of wages and the difficulty of obtaining an adequate supply of labour, agricultural machinery calculated to save manual labour has been an absolute necessity. Without the reaping machine the crops could not be harvested, and without the thrashing machine they could not be brought to market. Hence the trade in agricultural implements has reached gigantic proportions. From inquiries I made I found that at least 100,000 reaping and mowing machines are made annually in the States. I was there during the harvest—everywhere the reaper was to be seen going; the scythe or the sickle was just as exceptional as the reaping machine was in England ten years ago. The thrashing machines were very inferior to ours, though the Americans were very apt to think they were far ahead of us, and that we were a very slow people; their machines were almost exclusively worked by horse-power. One farmer on the banks of Lake Ontario, who had ten horses yoked to his thrashing machine, seemed much surprised that in England we did all our thrashing by steam-power. He had never heard of such a thing. The implements of the farm, if we except reapers, are of very inferior design and build to our English machines. I thought one great want in American farming was good steerage drills and horse-hoes to follow. In a country where labour is so scarce and dear, the hoeing of the corn crop by animal power would be an immense boon. The drills are not made with a steerage; consequently, the drilling is bad, rendering the use of the horse-hoe impracticable; and, as labour is so dear, in most cases the corn and the weeds seem to be left "to grow together until the harvest." Nearly the whole of the implements are furnished with a seat for the men to ride—the idea being to get more work out of the labourers. I found the prairie farmers very desirous of having a good "gang plough," as it is called, on which the ploughman could ride. I told them if the men had easier work, it would be at the expense of the horses. As reaping machines are used, and in consequence open furrows undesirable, the land is frequently ploughed as follows:—A short ridge is set in the middle of the field, the plough passing not only up and down each side, but a furrow is taken off in going round at each end. By this means the plough is always in the ground, and the whole field ploughed without leaving an open furrow. A field may also be commenced by ploughing a furrow all round the outside, and finishing in the middle. The American farmer is not satisfied, as we are, with one team ploughing an acre per day; but expects from each team of a pair of horses two acres to two and a-half acres. I rather doubted so much being done; but was over and over assured by both masters and men that two acres and a-half were not at all an unusual day's work. The furrows, I must tell you, are over a foot wide—none of your fancy ploughing-match style. The land is also generally much lighter than our English soils, and the ploughing is, according to my notions, very much too shallow—a fault not at all uncommon on this side the Atlantic. Steam ploughs have not yet been introduced. Several attempts have been made; but as all the schemes have been with engines to travel over the surface—after Romaine's plan—no wonder they have not succeeded. On the prairies there would be no difficulty in constructing machinery capable of breaking up twenty or even twenty-five acres of such land per day, and this with only three men. Where labour is so scarce, and time such an object, the advantage of the steam plough would be immense. In Iowa I saw a very simple and efficient apparatus called a "horse pitchfork" for raising crops on to the stack, a horse simply drawing the load over a pulley. I also saw a hay-loader attached to the rear of a waggon, and which gathered up and elevated the crop on to the vehicle, thereby saving much manual labour."

Iron Bedsteads have been long made for use in hospitals, workhouses, and barracks; but it is not more than thirty years since the trade was fairly established, and iron and brass bedsteads began slowly to find their way into the houses of the middle and lower classes, and the less important sleeping rooms in the best houses in the country. One of the advantages which metal bedsteads possess is the facility with which they can be put together, or taken down, owing to the simplicity of the joints by which the several parts are united. It is a simple dovetail joint, and consequently requires no nut, cotter, or other loose part liable to be lost or to get out of order; and its superiority over its predecessors is attested by the fact that except in officers' bedsteads, those for lunatic asylums, and some few other special cases, it has superseded all others. At the same time that the dovetail joint was adopted, a very convenient and cheap method for making the head and foot rails of iron bedsteads was introduced. This consists of uniting the separate parts of the rails consisting of pieces of rod iron, round, oval, or any desired section, by means of castings in chills or iron moulds. From the date of the introduction of these improvements, about twenty years ago, the trade has developed rapidly. In 1849 there were not more than eight manufacturers who could be reckoned as established in the trade, and of these four or five belonged to Birmingham. Since then the number of well-known makers in that neighbourhood has increased to twenty, and the number of finished articles produced weekly from about 400 or 500 to 5,000 or 6,000. These are absorbed in nearly equal quantities by the home and foreign trades. There are a few manufacturers in London, and some very small ones, hardly worth

notice, in other large towns; but nowhere except in Birmingham and London, and hardly in London, can the manufacture be said to exist as a trade. It is carried on in various continental countries, particularly in France, Italy, and Spain. In Birmingham there are probably from 2,000 to 2,500 persons employed in the manufacture, without reckoning the subsidiary trades of tube-making, malleable iron casting, &c.; of these about half are boys, and one-sixth girls and women.

Tobacco Manufactory at Nice.—This manufacture, which before the annexation was carried on in a small and unhealthy locality, now occupies a vast and handsome building, with a better ventilation than that prescribed by science for barracks and hospitals. Under the Sardinian government it gave employment to about two hundred women; now it gives occupation to seven hundred and twenty men. The average day wages, which were formerly 40 centimes, are now 1 fr. 51 cents. for women, and the men can earn about 3 frs. 56 cents. The average rate of wages for apprentices is fifty-four centimes. It is anticipated that five years hence from fourteen to fifteen hundred persons will be employed. In France there are seventeen tobacco manufactories, each of which has its own speciality; that of Nice having acquired a reputation for the superiority of its cigars, *bouts coupés* and *bouts roulés* at five centimes each.

Sericulture in Syria.—The principal localities in the province of Aleppo where the mulberry is cultivated and sericulture is carried on, are the districts of Antioch, Orfar, and the neighbouring countries. The rearing of silkworms there is susceptible of a considerable development, especially in the vast plains of Hamk, situated between Aleppo, Antioch, and Alexandretta, where the land offers all the desired conditions; but the scarcity of manual labour, and the vicinity of lawless tribes, have been great obstacles up to the present time to agriculture. These districts have not been spared from disease any more than other countries where sericulture is carried on. In the towns of Arsons, Payas, and Karadach, in the district of Antioch, where the annual produce formerly amounted to about 44,100lbs. of silk, there has been a considerable reduction. Since the first appearance of the epidemic it has not entirely disappeared from any of the localities that have been smitten with it. In this country the peasants alone devote themselves to the rearing of silkworms; and it is by great efforts and labour that they have been enabled to pass through the crisis that has so desolated the country. A great number of persons have cut down their mulberry trees in order to cultivate the land, and more especially to grow cotton. Those who, possessing sufficient land not to have been reduced to this extremity, still continue to cultivate the mulberry, though always giving preference to other cultures, being persuaded that the disease once produced is transmitted from the worm to the seed (egg), have been obliged to procure healthy seed from places that are known to be exempt from the epidemic. Although their endeavours have not been always successful, it appears that last year a very healthy seed was obtained from Tchandir, a village situated near the river of the same name, a tributary of the Cestrus, about ten leagues to the north of Adalia (Satalia). This seed has been most successful everywhere it has been employed, but for the first time only. The silkworms that were hatched from it produced an unhealthy seed, and the worms from it were directly attacked by the disease, and sericulturists are obliged for the future to use exclusively the Tchandir seed, which it is necessary to import every season from Tchandir. The great demand has rapidly augmented the price, which last year was as low as five piastres (11¼d.) per dram. This year it has been sold for double the price, and it is much sought after, as its yield is in the proportion 80 drams of silk to one dram of seed. Although the province of Aleppo has suffered greatly from the epidemic, it is to be hoped that by the introduction of the new seed, the results of which have been most advantageous, the evil will be overcome, and that ancient prosperity will reappear.

Commerce.

International Currency.—By the terms of the monetary convention recently concluded between Belgium, France, Italy, and Switzerland—the four governments which have already an uniform system of weights and measures—bind themselves to the adoption of one uniform gold and silver currency throughout their states. For the complete execution of the scheme of an international currency, the copper coinage should also have been assimilated, but at present the experiment is limited to the gold and silver coinage; though, as coins of the latter denomination will be included, in value as low as 0·20 of a franc, or about 2d. of our money, the uniformity will be sufficiently general for all practical purposes. The gold coins are to be five in number, of the value of 100 francs, 50 francs, 20 francs, 10 francs, and 5 francs respectively, all of a certain weight, size, and value prescribed in the terms of the agreement. Similar rules apply also to the silver coinage, which is also to comprise five pieces, in value 5 francs, 2 francs, 1 franc, 0·50 franc, 0·20 franc respectively. Each state is to have the power to refuse all coins "whose weight shall have been reduced by wear to the extent of 0·50 per cent. below a certain fixed allowance in the case of gold, and 0·5 in silver, or where the stamped impressions shall have been effaced." Two years only are allowed for the withdrawal of the existing circulation, and the contract is to remain in force for a period of fifteen years, when the results will be carefully investigated. It is also provided that "the right of acceding to this convention is reserved to any other state which shall accept its obligations, and which shall adopt the monetary system of the union in whatever relates to gold and silver specie." The *Produce Markets' Review* observes that this movement in the direction of uniformity, initiated at present by only four of the European governments, is one that, like our free-trade system, or railway communication, or the employment of steam-vessels, or any other ideas of a similar character, originating in the mental activity of the present century, will surely make its way sooner or later amongst all nations which would not behind the age in which we live. The question of an international currency is, in fact, a question of the adoption or rejection of the decimal system, and though there is much that can be urged in defence of other systems, the superior merit of convenience, facility, and correctness in making calculations, must surely outweigh any advantages that may result from the fact that a given number admits of being subdivided into a greater number of divisors. The number 10, for instance, has but two divisors, 2 and 5, whilst 12 can boast of having twice as many—2, 3, 4, and 6. It is not to be denied that there are advantages to be found in existing systems of calculation, but the decimal system alone insures us a rapid and infallible method of performing the arithmetical calculations most in use, whilst it enables us entirely to dispense with others. Those who are practically conversant with the details of work performed in any large counting-house, know by experience the amount of labour and time required for "casting out," as it is technically termed. It is within limits if we estimate the saving of labour in calculation that might be effected in this direction by the adoption of the decimal or metric system of coinage, weights, and measures, at about 25 per cent.; that is to say, where a man now employs one hundred clerks he might do the work with seventy-five.

Commerce and Industry of Tchefou.—Tchefou is situated most favourably for commerce. The French have established there a naval station, and a store of coal procured from Northern China. The British navy

also possesses an island situated in the bay that serves as depôt and hospital. Ships of war of both nations constantly anchor there. Tchefou is the nearest port to Pekin, and is at no time of the year blocked up by ice. From this place during the winter, at the arrival of each mail, the couriers of the embassies and commercial correspondents leave for Pekin and Tientsin. Should the progress of European influence one day induce the Chinese Government to establish free trade, it cannot be doubted but that Tchefou will become a free port open to all kinds of merchandise, and also the great entrepot of European commerce in Northern China. The silk-growing districts bordering on this town are as yet all but unexplored, and in no case have been cultivated. They contain, however, for the regeneration of the exhausted races of the silkworm, resources that might be very valuable if they knew how to turn it to account. The wooded mountains of the environs feed, in fact, a species of wild silkworm that spins a brown silk, the quantity of which might be brought to market would not amount to less than 12,000 bales yearly. The quality of these silks varies according to the various modes employed for the winding, and the care used in this operation. The fabric which is made of it is called in the country *pongee*, and 100,000 pieces of it might be purchased annually. The province of Tchefou also furnishes a large quantity of fine yellow silk. In 1861 and 1862 a thousand bales of this silk were exported; but since a very small quantity of it has been sent in the market, being exclusively employed by the silkweavers of the country for the manufacture of fabrics for local consumption. Formerly, the greater portion of the silk fabrics worn in the north came from Foochoo and other manufacturing towns in the south. This trade has ceased since the devastations of the southern provinces from rebellions, and at present the value of silks imported to Tchefou only amounts to about 1,200,000 francs, or £48,000 annually. The silk trade can only attain some importance in this port by the necessity of the interchange of products of the soil for European goods.

Merchant Navy of Norway, Sweden, and Denmark.—In 1864 the merchant navy of Sweden was composed of 3,198 vessels, the total tonnage of which amounted to 381,162; and the number of Norwegian ships, according to the returns of 1865, amounted to 5,407, of a total tonnage of 1,058,847. The figures show that the total number of vessels of the United Kingdom of Sweden and Norway amount to 8,605, and represent a tonnage of 1,440,009, and give employment to about 48,300 seamen. An increase of 570 vessels, the total tonnage of which amounts to 5,990, has taken place in the merchant shipping of Denmark within the last two years, which formerly was composed of 3,079 vessels, of the total tonnage of 74,140, now numbers 3,649 vessels, with a total tonnage of 80,130; this shows an increase of 8 per cent.

The Trade of Ostend.—The last vessels employed for the cod fishery have now returned to Ostend, and the last sales of this fish have been effected. This year 13,683 tons of cod-fish have been taken by the Ostend fishermen, of which 13,137 tons is Doggerbank cod, and 546 tons from Rockall and the Feroë Islands. This shows an increase of 871 tons on the take of last year, which amounted to 12,712 tons. The quality is excellent, and finds a ready sale. The number of vessels employed in this fishery was exactly the same as that of last year, namely, 156; and the Ostend fishermen still continue to go to Doggerbank in preference to any other spot. The oyster trade has not made any decided improvement on that of last year, although there has been an important reduction in prices. The oyster merchants of Ostend are now bound, by an agreement amongst themselves, to keep up the prices of oysters, and this is partly owing to the general thinning of the beds. This price, however, is considerably below that of 1865. Lobsters are likewise an article of an important trade; they are usually imported from Norway, and are sold at from one to six francs each, according to their size, or whether alive or dead.

Imports and Exports.—The value of the goods imported into the United Kingdom in 1865 amounted to upwards of £271,000,000; and that of the exports, of British produce and manufacture, to nearly £166,000,000 sterling. Twenty-five per cent. of all our import and export trade arises out of commerce with the eastern countries—India, China, Egypt, Japan, and Australia.

Customs.—The annual Customs' report for 1865 shows a satisfactory result as regards the commerce of the port of London. In all departments of trade there is an increase, which is most marked in the case of tea, as the tendency exists to concentrate such cargoes in the port of London. The quantity of tea entered here for home consumption amounted, in 1865, to no less than 61,000,000lbs., which produced 62½ per cent. of the whole duty collected in the United Kingdom.

Coal Exports.—The exports of coal in the nine months ending September were 7,586,500 tons, against 6,938,213 tons and 6,615,915 tons for the corresponding periods of 1865 and 1864. The shipments have increased more or less considerably this year to Russia, Sweden, Denmark, the Hanse Towns, Spain, Italy, Brazil, and British India; but they have decreased to Prussia, Holland, and the United States.

The Bamboo, which grows abundantly in most of the West India Islands, has been for some time past largely exported from Jamaica to New York in bales and bundles for the purpose of being manufactured into paper, and has been proved equally as valuable as rags.

Colonies.

Tea Cultivation in Australia.—The following is from the *South Australian Register*:—"The idea that the China Tea-tree is a delicate plant, and that its success in a climate like this is impossible, will probably turn out to be a great fallacy, if the matter is fairly tested. We are therefore glad to see that the Government have purchased £50 worth of seed, and that a portion of it is to be carefully sown in the Botanic Garden, whilst the remainder is to be distributed throughout the colony, so as to try a variety of situations and soils. From a great deal of information on the subject, which we have obtained from Dr. Schomburgh, it appears that the China Tea-plant may be easily acclimatised in South Australia, for it is a plant which successfully resists drought, frosts, and other severe atmospheric changes. What is particularly important to us is, that so far from a large quantity of moisture being required, it is, in fact, injurious to the plant; and therefore in Asia its cultivation on a large scale is pursued chiefly on the tops and slopes of hills, where good natural drainage is secured; but it flourishes equally well in the soil of plains, where the water does not lodge so as to form puddles about the roots of the trees. As to the soil required, the best is vegetable mould, largely mixed with sand; but it also grows well in many other soils. It takes good hold of the ground, and flourishes in those spots where a thin stratum of earth overlies metamorphic slates, intersected by trap rock, or where the subsoil consists of stony fragments or packed boulders of coarse granite. As to the mode of preparing the ground, sowing the seed, and treating the young plants, we will proceed to give our readers all particulars, as supplied by Mr. Sterndale, who is practically acquainted with the subject, to Dr. Schomburgh. That gentleman says it matters not whether the land for a tea plantation be flat or highly inclined, provided that the soil be suitable and sufficiently drained; but on no account should the land be liable to be flooded or swamped during the rains. Manuring or irrigation are quite unnecessary, unless when applied to weakly seedling plants under the age of twelve months. That the plant is excessively

hardy has been proved by experiment at various altitudes, from 200 to 10,000 feet above the sea level, at which last great height it is found wild in the forests in the form of a hard wood tree, of a height of 25 ft. by 1 ft. diameter, of which the extreme age is unknown. These trees are exposed to storms, snowfall, and frosts, which congeal the streams to the thickness of several inches of ice, while in other localities they are occasionally subjected to hot winds and long drought, under which cereal crops perish for lack of moisture. The general practice in preparing the land is by the ordinary system of ploughing, unless in rocky or precipitous places, where the ground is loosened with a pickaxe to the depth of one foot, for the reception of each seed or plant, the intervening spaces being left undisturbed. Tea plants in Asia flower from about the middle of August to that of February, and the seeds ripen in about thirteen months. All the plants do not come into flower at once, but some are in flower in September, others in November, December, or January. Many throw out a second set of flowers in March, April, May, and during the winter; so that from the same plant unripe and ripe seeds and flowers may be gathered at one and the same time. The first year the number of plants varies from one to seven. The seeds are contained in a capsule. To ascertain when they are ripe, open the capsule, though green, and if their colour is a nut-brown they are ripe; if not ripe, they are of a reddish colour mixed with white. If the seeds are allowed to remain on the bushes a short time after they are ripe, the capsules burst and they fall out. It is necessary, therefore, to remove them. The plants are usually placed at five feet distance from each other, which takes about six pounds of seed to the acre. If the seed be fresh, the general practice is to plant it out at once in the spots where it is intended to permanently remain. This is done by digging a hole, with a pickaxe or mattock, one foot deep, filling it with the loosened earth, and sticking the seed about three inches below the surface. In cases of experiment with inferior seed, or upon untried land, it is most advisable to plant in nursery beds, about six feet in width, into which the seeds are dibbled or drilled at two or more inches apart from each other. The most suitable season for this operation is the commencement of the winter rains, as the moisture materially assists their germination. Some will germinate in four or six weeks, but many will lie dormant for four months, and in most cases none will grow until the advent of the rains. Young small seedling plants stand extreme cold badly; if, therefore, they germinate at such a time, they ought, in a new climate, to have a top dressing of manure, and to be protected by branches or grass, which, when the sun shines, should be removed, to give them the advantage of his beams. In this manner small plants may become fit for removal in two months. As soon as the young plants are three inches high they ought to be weeded, for if weeds are allowed to remain they draw them up, and thus make the plants thin and weakly. It matters not though the weeder, in removing weeds, disturbs seed germinating, as they can easily be put in the ground again. Moreover, the advantage given to the young plant, by opening up the soil around them is great, and more than compensates for the injury done. Plants are sometimes raised from layers and cuttings. The most favourable seasons for these operations is when the sap is beginning to rise and in full action, as during the rains. Seedling plants ought not to be transplanted until eight inches high, and in planting them on the slopes of steep hills care should be taken to place them horizontal to the dip of the land, as the earth is not so liable to be washed away from the roots by the heavy rains. Tea leaves ought not to be gathered until the third year, and then during the rains, in order to allow the bushes to attain a considerable size. If the plants send out long leading shoots in the second year, these ought to be nipped off in order to induce the plant to thrown out lateral shoots, and become of a thick and bushy form, yielding abundance of leaves. Tea leaves are gathered during the rains, the number of pluckings of each plant being four, and in very wet seasons five, with an interval of from four to six weeks between each. Each plant will yield in the third season about half a pound of raw leaves, or two ounces of manufactured tea of a superior quality, giving an average of about 80 lbs. to the acre. Two years more will increase the yield tenfold, being $1\frac{3}{4}$ lbs. of manufactured tea to the plant. The process of gathering the leaves is extremely simple, and is chiefly performed by women and children. All old and fibrous leaves are left upon the tree. The young leaves are stripped off with the hand, an inch or so of the soft and succulent stalk being taken with them. The finest kind of black tea (Pekoe) is prepared from the tender buds at the extremity of the twigs, and for this purpose is kept apart from the rest. From the remainder are manufactured the more common kinds, viz.:—Souchong, Pouchong, Congou, Bohea, Young Hyson, Hyson, Gunpowder, Imperial Gunpowder, &c. A woman accustomed to the work will gather in a day from 16 lbs. to 20 lbs. of raw leaves. The proper time for sowing the seed in this colony (South Australia) is from June to August—the present is therefore a favourable opportunity for commencing."

Preserved Meat.—Under date October 27th, the *Melbourne Argus*, an Australian journal of great repute, refers to the operation of a new company on the Clarence River, for preserving meat and making extract of meat after Liebig's plan. The preserving is after the usual English process, but with the great advantage of its being performed where meat is rarely over $1\frac{1}{2}$d. per lb., and where, therefore, the picked joints are alone packed. The herds of Australia have the advantage of being derived from English cattle, and are only second to them in excellence. The preserved meat is of course principally intended for ship use, and a considerable portion will be sold in the colonies. The extract of meat will probably come to this country, and an opportunity of comparison will be afforded between that which is made of the wild cattle in South America, such as is now being largely sold in England, and the extract made of the progeny of our own English bulls. The *Melbourne Argus* states that the operations of the company are likely to be very extensive.

Publications Issued.

A History of Banks for Savings in Great Britain and Ireland. By William Lewins, author of "Her Majesty's Mails." *(Sampson Low.)*—This work gives an accurate account of the early history of savings' banks, and deals fully with their parliamentary history. With respect to the latest modification of the savings' bank principle as exhibited in the measures brought about within the last few years by Mr. Gladstone (to whom the work is, by permission, dedicated), the author's endeavour has evidently been to treat all the questions involved fully and impartially, and great pains has been taken to secure perfect accuracy both as to facts and figures. In reference to by far the most important measure relating to this subject, namely, the establishment of Post-Office Savings' Banks, the following extracts will not be without interest:—"Much that remains to be told of savings' bank reforms, and of other proposals to supplement the system by fresh provisions, may be told in connexion with the life of a gentleman to whom reference has already been made. Amongst those who have devoted much time and immense labour to bring about a better state of things in savings' banks, the foremost place is undoubtedly due to Mr. Charles William Sikes, of Huddersfield. Mr. Sikes, the son of a private banker of

that town, was born in 1818. We will pass over his early years, only remarking that he received a commercial education, and, in 1833, entered the employ of the Huddersfield Banking Company, the third or fourth joint-stock bank established in this country. It was while Mr. Sikes was cashier of this bank,—which, like other private banks, received deposits above £10, and allowed interest at the current rate,—that his attention was arrested to the question of banks for the people. He witnessed a considerable number of instances of workmen who, beginning with a few pounds, had silently amassed what was to them a little fortune of one, two, and even three hundred pounds; and he became deeply impressed, as he himself informs us, not only with the idea that the number of these provident working people was far less than it ought to be or might be, but that the social and domestic results for good that would ensue would be absolutely incalculable, if bank depositors among the working classes became the rule instead of the rare exception. About this time—the era of the free trade agitation—there was great distress in the manufacturing districts, and Huddersfield, like the rest of the West Riding towns was heavily visited. . . . . Mr. Sikes tells us that he had already begun to feel, that though much might be done for the working classes by kindly and temperate advice, the greatest share of the work of their social elevation would have to be achieved by their own individual efforts; he came to the conclusion that his work might well lay in endeavouring to stimulate the poor to more provident habits; and that, if there was anything in the constitution of such societies as were formed expressly to foster these habits which stood in the way of the poor man, the obstacles ought either to be quickly removed, or some new organization must be planned to effect this purpose. With this end in view, Mr. Sikes addressed a long letter to the editor of the *Leeds Mercury*, in 1850, which was subsequently republished in the form of a pamphlet, and widely circulated, recommending the formation of what he called 'preliminary savings' banks.'" The author then gives an account of the successive steps which Mr. Sikes took to accomplish the objects he had in view. In 1854 he appears to have published a pamphlet, entitled "Good Times; or, the Savings' Bank and the Fireside;" an admirable little annual for the class for which it was written, and which obtained a large sale. For some time, however, he appeared to have "carefully abstained," says the author, "from saying anything that would tend to lessen the influence or usefulness of the existing savings' banks; but in the year 1855 the time would appear to have arrived when it became necessary to attempt some reforms in their constitution and management." In 1856 he addressed an exhaustive letter to the Chancellor of the Exchequer, the late Sir G. Cornewall Lewis, on "Savings' Bank Reforms." Mr. Sikes deserves the credit of having been the first to point out the inherent defects in all parts of the savings' bank system, and the first to suggest an entirely fresh form of management. Everything that an ingenious marshalling of figures, an array of argument, and even eloquence could do, Mr. Sikes did, but all appears to have been equally unavailing. The Chancellor of the Exchequer made attempts, as we have before seen, in the House of Commons, to improve the organisation of savings' banks, but without success. When the Committee on Savings' Banks was appointed, in 1858, Mr. Sikes was called as a witness. He again described the plans which he had suggested in 1856, and which had undergone little or no modification since that time. The author proceeds as follows:—"Confining ourselves at present to the origination of the principle of Post-office Banks, without reference to the wonderfully simple and efficacious scheme afterwards organised, we find that several different gentlemen had between the years 1850 and 1860, and acting entirely unknown to each other, matured plans, and in one way or another actually proposed them, to remedy the deficiences of the existing banks, on some such principle as that eventually adopted. To Mr. Sikes belongs the undoubted merit and honour of having independently originated and matured a plan of operation more or less equal to the object in view; of having persevered in the object of bringing the matter prominently before the public; and of being so fortunate as to have proposed his scheme at a period when the country possessed in Mr. Gladstone a statesman of extraordinary versatility and power at the head of its financial operations, and who had given abundant evidence of his willingness to grapple with uncommon difficulties where a need is proved and the principles of a measure are shown to be sound. Having matured his plan in June, 1859, Mr. Sikes communicated it to Mr. Edward Baines, the member for Leeds, in the form of a printed letter; and this gentleman, well known for his wide sympathy with the industrious classes, after studying its details, expressed his warm approval of the project, and engaged to bring it under the notice of Sir (then Mr.) Rowland Hill, the secretary of the Post Office. That there was now no indisposition—if ever there was—on the part of the authorities to such a measure is evident from the reception it met with at their hands, as shown by the letter below.* Encouraged to persevere, Mr. Baines and Mr. Sikes had an interview with the secretary and some of the principal heads of the departments of the Post Office, when the draft of a plan was read to them for working such a measure. The next step which Mr. Sikes took was to place himself in communication with the Chancellor of the Exchequer, Mr. Gladstone, and he was met by a cordial acknowledgment. The letter, in which the scheme was explained, was then given to the public, and was read before the Social Science Association which met in Bradford in the autumn of that year, Lord Brougham having also mentioned the matter in his inaugural address. Several Liberal newspapers went warmly into an advocacy of the principles of the measure, if not of the measure itself; and in the early part of November, 1859, the members of the Huddersfield Chamber of Commerce strengthened the hands of their townsman by passing an unanimous sentence of commendation upon it; and not only so, but they resolved to send Mr. Sikes's pamphlet to all the Chambers of Commerce in the kingdom, recommending them to support the plan, which several of them eventually did. During the interval, Mr. Gladstone had amply fulfilled his promise to give the subject his best attention. . . . . The scheme may be said to have now soon passed out of Mr. Sikes's hands, and to have fallen into those of others, who saw that it would be necessary largely to remodel it, in order to make it fit into the machinery (of the working of which Mr. Sikes was necessarily ignorant) upon which it would have to be engrafted. On the 16th September, 1861, the Post Office commenced business with 301 offices as Savings' Banks, gradually increasing the number until in March, 1866, there were 3,369 Post Office Savings' Banks in the United Kingdom, of which 452 are in the metropolis, and in December last there were 611,819 open accounts, the amount accumulated being £6,526,400—an average of £10 13s. 4d. each depositor."

Handy Book of Rules and Tables for Verifying Dates. By John J. Bond, Assistant-Keeper of the Public Records. (*Bell and Daldy.*)—No book of any importance on this subject has been published since that

* Mr. Rowland Hill to Mr. Baines, M.P., 2nd August, 1859.—My dear Sir,—With modifications which could readily be introduced, Mr. Sikes's plan is, in my opinion, practicable so far as the Post Office is concerned. The plan also appears to me to be practicable in its other parts; but on these I would suggest the expediency of taking the opinion of some one thoroughly conversant with ordinary banking businesss, and who is acquainted also with savings' banks. I need not add, that if carried into effect, the plan would in my opinion prove highly useful to the public, and in some degree advantageous to the revenue. I should be most happy, when the time arrives for doing so, to submit it for the approval of the Postmaster-General.—Faithfully yours, Rowland Hill.

by Sir Harris Nicholas, based mainly on the French work entitled "L'Art de Verifier les Dates." The present work is the result of twenty years' experience in dealing with the chronology of public records and ancient documents, and sets forth, in a very lucid manner, the importance of a thorough comprehension of the changes of style in writing dates, especially in connection with legal and other documents. In the introductory preface, Mr. Bond illustrates this by quoting some instances where the change of style has been overlooked by historians and others. One of these, taken from M. Guizot's "History of Oliver Cromwell and the English Commonwealth," is as follows:—"Anne of Austria and Cardinal Mazarin thought it fitting that the young King of France should make some effort to save the life of the King (Charles I.) his uncle, and Louis XIV. accordingly wrote two solemn letters to Cromwell and Fairfax; but before M. de Varennes, who was appointed to deliver them, had left Paris, Charles I. was executed." These two letters are dated "Saint Germain, 2 Fevrier, 1649," corresponding in fact with the 23rd of January, 1648-9 in England; and as the king was executed on the 30th January, 1848-9 (according to the English computation), in all probability there was time for the messenger to have arrived in London between the 23rd and 30th of January. That the alteration from the Julian, or old style, to the Gregorian, or new style, was not made in England until the year 1752, is a fact which has evidently been overlooked. When the adoption of the Gregorian, or new style, into Great Britain was decided upon, a Bill (24 George II. 1751, cap. 23), which Mr. Bond quotes at length in his preface, was passed, and excited general unpopularity. Hogarth, in his painting called "The Election Dinner," has introduced a placard, illustrative of the feeling prevalent amongst the majority of the people, bearing the words, "Give us back our eleven days." To notice in detail each portion of the book would occupy more space than is at disposal; it may, therefore, suffice to state that the more important features are, the information relating to the time of the adoption of the new style in various countries and states; the concise and excellent tables for finding Easter Day; the tables of regnal years; the French revolutionary calendar, and comparative tables of dates and days of the English calendar and the revolutionary calendar, and the perpetual calendar, which has been noticed already in this *Journal*. As a specimen of typography, the book reflects the greatest credit on Messrs. Whittingham and Wilkins. From the foregoing remarks it will be seen that the work is invaluable to persons engaged in the law and literary pursuits, and affords an amount of information interesting to the general reader.

Notes.

Chimney Sweeping.—It is stated that our present system, in which the machine heads or brushes are formed of woody fibre, is very imperfect for thoroughly cleansing the chimneys, especially in removing the hard lumps of soot which accumulates in them. A new brush has been invented, in which the woody fibre of the brush or head is replaced by steel. The brush itself is a hollow tube of iron, on to which is loosely put four box wood collars about half an inch thick, each having a circular groove in it, for the insertion of numerous finely-tempered steel bars, which radiate from the centre of each collar; the four being firmly bolted together by suitable brass work; this forms an elastic brush, closely resembling those in common use, but with this essential difference, the steel bars, being very elastic, penetrate the whole and every part of the aperture of the chimney in their ascent, no matter how awkwardly built, and allow the light soot to fall through them, and do not put it on the roof; and in their descent thoroughly remove all the hard, so that there is none left in the chimney to take fire. The inventor, Mr. Thomas Welton, urges this as a manifest advantage over the usual machine; and, in addition, enumerates the following advantages:—It will promptly extinguish a fire in the chimney without damage to the brush. It will core a new chimney without climbing. It can be easily taken to pieces and repaired at a trifling expense by almost any person. It can have a ball and chain attached, so that it may be used from the roof. It fits the brass joints and canes at present in use. It will in many cases cheaply cure a smoky chimney by simply keeping it clean. It will at once, by its use, arrest the accumulation of the hard, tarry masses of soot in kitchen chimneys, builders' workshops, and other buildings where wood, refuse of vegetables, spillings of fat, bones, cuttings of leather, and bituminous coal are burned.

Canadian Railways and Telegraphs.—The government return for the year 1865 shows that there were in that year 2,148 miles of railway in Canada open for traffic. Their cost has been 121,543,189 dols. The receipts for 1865 amounted to 10,910,678 dols. The total working expenditure was 5,778,343 dols. Renewals cost 1,355,759 dols. The Grand Trunk line, 1,377 miles in length, had 38 deaths by accident in the year; the Great Western, with 345 miles, 15; the Northern, with 97 miles, 5. There are three telegraph companies at work in Canada—the Montreal, the Provincial, and an American company, the Vermont and Boston, which has 43 miles of telegraph line in Canada. The total length of the lines in 1865 was 4,978 miles; the number of messages sent 479,331.

Nitro-Glycerine for Blasting.—Some interesting experiments have lately been made in the canton of Neufchatel with nitro-glycerine, in order to detach some large blocks of rock on the right bank of the Areuse, for the purpose of constructing a dam across the river, to prevent the materials occasioned by landslips being carried down by the floods. The first hole was drilled half-way up the side of the mass of rocks facing the river, 21 feet in depth and two inches in diameter, and was charged with only six pounds of nitro-glycerine; the block of rock that was detatched was about 300 cubic metres. A great part of the *debris* fell into the river.

Oldest Newspaper in Europe.—At Ghent (Belgium) there is a Flemish newspaper published, the *Gazette van Gend*, which, perhaps the oldest in Europe, will have been in existence for the last two centuries on the 1st January, 1867. As a souvenir of this anniversary the subscribers are to receive a copy of the oldest number at present in existence. It bears the date of 8th September, 1667. The copies, which have been made by means of photography, have succeeded so well, that it is difficult to distinguish the copy from the original.

Joiners' Work.—An importation of joiners' work has lately been made into this country from Stockholm, consisting of panelled doors, jamb-linings, architraves and skirtings, machine-made and well put together, of excellent workmanship and of first-rate material. They are made to English sizes, and have been offered for sale at prices considerably below those which are given for English work and material of the same quality. It is understood that the machines which have been employed in making them are of English manufacture, imported into Sweden.

Paris Exhibition of 1867.—It appears that the Emperor has asked the King of Prussia to send one of his model schools to the Exhibition; accordingly, not only will there be the *fac-simile* of a Prussian village school, but the master's house and the playground. The school-room will contain the books, maps, copy-books, &c., in present use in every Government school of that kingdom, besides specimens of essays, extracts, &c., actually done by Prussian school children. Those who take an interest in popular education will be able to judge of the advances of instruction in that kingdom.

Population of Paris.—The number of inhabitants at the present time in Paris is 1,825,274. The census made at different times give the following numbers:—

	Inhabitants.
In 1292	215,861
1553	260,000
1718	509,000
1755	576,000
1784	660,000
1800	547,756
1817	713,966
1841	935,261
1846	1,053,897
1851	1,053,262
1861	1,696,131

As to the number of houses in Paris, the author of *Paris, Ancien et Nouveau*, reckons in 1685, 23,223 houses facing the street, not counting those in courts or gardens. Sauval, in 1733, gives 25,000 houses in round numbers. Germain Brice, in his *Description de Paris*, only gives 22,000 in 1752. M. Husson, in his book the *Consommations de Paris*, remarks on the inaccuracy of Sauval, who gave the number of houses in Paris as 25,000, nineteen years previous to Germain Brice, who gave 22,000 only. The *Miroir de l'ancien et du nouveau Paris*, published in 1807, gives 30,000 houses. In 1812, the *Dictionnaire des Rues de Paris*, by La Tynna, reckons 29,400; this is evidently an exaggeration, as by the official census taken in 1817, there were only 26,801; in 1841, 28,699; in 1846, 30,221; in 1851, 30,770; and in 1855, 31,650.

Exhibition at Pernambuco.—The Exhibition at Pernambuco, that was held during the month of October, was closed on the 20th of that month, as the articles, selected by a special commission to be sent to the Paris Exhibition, had to be first sent to the Exhibition at Rio Janeiro, where a fresh selection will be made, to decide which are to be sent to France. As there is but little manufacturing industry at Pernambuco, the articles exhibited were but few, and of little interest. The natural products, on the contrary, were numerous and important. Without mentioning cotton, coffee, and sugar, of which there were magnificent samples, there was a fine collection of woods, textile plants, flour prepared from the banana, arrowroot; a kindof vegetable fibre, admirably adapted for the manufacture of ships' cables, being indestructible by sea water; a clay of a whiteness and unexceptionable purity, suitable for the manufacture of porcelain; the carnauba, a material from which candles of a tolerably good quality are made, and which is also used by sculptors and medal engravers, on account of its plastic qualities and charming yellowish-brown tint; a considerable quantity of well-known medicinal plants, the greater part of which are extensively used in Europe. The collection of woods alone well repaid a visit, amongst which the *Secupira* is especially worthy of note, as being well adapted for indestructible railway sleepers, a specimen having been kept under water for eight years, and being as sound as when first cut from the tree. Amongst the vegetable tissues, those of macaïba, of tucum, of canapixo, and of banana; the first, especially, are of an extreme fineness, and, at the same time, of great resistance; a fishing-net made of macaïba thread would last a great deal longer than one of common twine, and it is evident that very beautiful and solid fabrics might be manufactured from it.

Correspondence.

Indian Architecture.—Sir,—I should have been very glad to make a few observations on Mr. Fergusson's paper, had I not feared to protract the discussion. From the time that Mr. Fergusson first brought forward the subject of Indian architecture, I have always felt that it is one of great importance in relation to the promotion of art. It illustrates the catholicity of art, and being, as Mr. Fergusson says, free from our own conventional associations, it enables us to study principles without prejudice, and more particularly to ascertain the characteristics of beauty. Beauty is assuredly no recognisable feature in the architecture of India. As to the indispensable connection of fitness and utility with beauty in Indian and other architecture, I am less confident. Forms and details in Indian architecture have no necessary relation to utility, whether they are beautiful or otherwise. Mr. Fergusson is justified in including in his scope Mussulman architecture, for the reasons he has stated, and I can confirm some details. The Mussulman system is not an abolition of previous systems, but a continuation of them. Hence, in religious theories and practices, in jurisprudence and in adminstration, in poetry, in architecture, and in numismatics, we trace the influence of preceding nations and of the localities in which the new worship is introduced. Hence the necessary distinctiveness of style in Egypt, Spain, Persia, and Turkey. In Turkey, as he says, some buildings for Mussulman worship are simply conversions of Byzantine edifices; others are based on them; Greek architects were in the first instance employed, and now, in many cases, Armenian architects and artists. These architects and artists, whether Mussulman or rajah, are of the class described by Mr. Fergusson—they read little, they draw little—but they study nature, and employ experience and common-sense; and their expedients, handed down from ages and consecrated by experience, are well deserving of attention. It is thus that schools of art are maintained now as in the middle ages—in some cases by the practitioners of the arts, in some cases by monastic institutions, as by members of the bodies of dervishes. All these considerations bear upon the ethnographic value of architecture. This, with other circumstances, was well developed by Mr. Fergusson in his uncompleted works on the philosophy of art, and especially of architecture; and it illustrates the principles upon which architecture and art generally are to be studied. It must be, as he has shown, by observance of the general connection of all art and knowledge on one basis of the unity of science and truth. We shall elevate architecture by bringing it into closer communion with the great body of science, and by bringing to bear upon it the resources and appliances of the world of knowledge. Architecture is, undoubtedly, a great instrument for ethnography, neither more nor less so than philology, but under the same conditions, and this leads me to endeavour to define more forcibly than Mr. Fergusson did, the ethnographic value of architecture. We need no more expect from architecture than from language the functions of precisely determining the race of a people. Architecture, like language, is communicated wholly or partially. Greek architecture or Greek language may be used by an alien people, but we have two results—first, the historical incident of the communication of this Greek element; and, second, its modification by the people to whom communicated. Architecture resembles in its functions the literary functions of language. Just as technical words of Greek or Arabic are communicated to other languages, so are the elements of art; and wherever we find distinctions in this respect we must look for ethnographic differences in the source or origin, in the races to which communicated, or perhaps for both together. This suggests itself with regard to the Hellenic and Ionic art. Helenic art may have resulted from the adaptations of Egyptian forms by an Hellenic people—Ionic, from the adaptations of Assyrian germs by a people of Asiatic constitution. Whether as regards the past or the present, Indian architecture merits study. For the past it enlists the scholar; for the present, as being a living school of architecture and art, it calls upon the practical man to study and apply its principles.

Until we succeed in creating in England a living school of art, we shall still, as we do now, halt short of a satisfactory result, with all the labour and all the effort we have applied.—Yours, &c., Hyde Clarke.

Storm Signals.—Sir,—I have learnt with much regret the recent decision of the Board of Trade on storm signals, and think their circular should not pass altogether without remark. Admiral Fitzroy was a man who spent a lifetime in the study of meteorology as applied to weather prognostics; and towards the close of his life established a method of signalling on the coast the approach of storms, with a view to caution our seafaring population against approaching danger. The thing is organised, signals erected, the people to a certain extent used to them, and it seems a pity that all he has done should now be abolished; it seems a slur upon the memory of a man who has doubtless done much good in calling the attention of the people to the great use of the barometer as a weather-glass. Might not the signals be under the care of the local government, and the rules for using them given by the Board of Trade or some scientific body? We are told, in answer to that query, that these warnings are founded on rules mainly empirical, and, therefore, should not be issued under the superintendence of a scientific body. Admiral Fitzroy says, in his report published in May, 1864, "That we have proved experimentally how winds and weather may be foretold with general accuracy for two days, at least, in advance, our reports since 1861 have shown." Now, if I were told that such prophesies were "founded on rules mainly empirical," I should say, no doubt of it; the Admiral certainly very much overshot the mark there; but with storm warnings the case is different altogether. By the barometer we have never-failing indications of great storms, and it is only great storms that the sailor fears; moreover, as it would be necessary to lay down certain definite rules for the guidance of those in charge of storm signals, I would suggest that it should be an instruction to them to hoist a signal "Caution," whenever the barometer is below 30 inches, and falls at the rate of three hundredths per hour; and one of "Danger" whenever it falls at the rate of five hundredths per hour; and that the reasons why these signals are hoisted should be published. As I think that Admiral Fitzroy's judicious efforts to save life should not be altogether set aside, I would suggest to those in authority that this proposition should receive their consideration, feeling satisfied that it is altogether free from the charge of empiricism.—I am, &c., Robt. H. C. Wilson.

12, Wilson-street, Gray's-inn-road.

MEETINGS FOR THE ENSUING WEEK.

Tues. ...Pathological, 8. Annual Meeting.
Anthropological, 3. Annual Meeting.
Geologists' Assoc., 7½. Annual Meeting.
Royal Inst., 3. Professor Frankland, "On the Chemistry of Gases." (Juvenile lectures.)

Wed ...Pharmaceutical, 8.
Obstetrical, 8.

Thur ...Royal Inst., 3. Professor Frankland, "On the Chemistry of Gases." (Juvenile lectures.)

Sat. ...Royal Inst., 3. Professor Frankland, "On the Chemistry of Gases." (Juvenile lectures.)

Patents.

From Commissioners of Patents' Journal, December 21st.

Grants of Provisional Protection.

Air, measuring the temperature of—3101—C. Wood.
Armour plating—3033—J. H. A. Gruson.
Artificial incubators—3057—J. Brindley.
Beer casks, tapping—3073—W. R. Lake.
Bench vices—3174—B. J. B. Mills.
Bleaching—3091—C. D. J. Seitz.
Bottles, washing—2573—W. E. Hickling.
Breech-loading ordnance—3049—J. H. A. Gruson.
Bricks—3203—J. Toward.
Brushes, cylinder—2761—J. P. Debauche.
Brushes—3154—H. P. Truefitt.
Cardboard—3127—G. Backhouse.
Cast steel railway wheels—3123—A. V. Newton.
Chain cable holders—3171—W. H. Harfield.
Clocks—3023—W. E. Gedge.
Composition rollers—2955—G. F. Freeman.
Compound steam engines—3158—J. Ramsbottom.
Cooking apparatus—3156—J. Webster.
Corkscrews—3162—H. Bateman.
Cotton seeds for decortication, preparing—3021—F. H. Gossage.
Elastic seats—3135—G. Howard.
Electric telegraph wires, insulating—3192—W. A. Marshall.
Fibre, combing—3037—T. Whitley.
Fibrous substances, carding—3121—L. Law.
Fibrous substances, spinning—3119—J. Kerfoot.
Fibrous substances, twisting—3069—J. Berry, J. B. Turner, and C Vickerman.
Floors, coverings for—3053—J. Tasker.
Fuel, economising—3081—J. Robinson.
Furnaces—2259—D. Caddick.
Furniture springs—3129—H. Timmins.
Grain, cleaning, &c.—3061—P. G. B. Westmacott.
Gun carriages—3035—J. H. A. Gruson.
Heavy bodies, raising—3371—J. H. Johnson.
Horse hoes—3150—W. W. Pilcher.
Iron into steel, converting—3111—T. J. Barron.
Leather, uniting—3099—C. H. Southall, R. Heap, and J. Tasker.
Magnetic engines—3039—J. Baker.
Minerals, cutting—3063—P. Gledhill.
Motive power—3125—R. George.
Motive-power engines—3029—J. Bernard.
Mowing machines—3107—J. E. Boyd.
Nails—2969—A. Scholey.
Nails—3095—W. Bass.
Piston-rods, packing—3206—J. Barwick and S. Tyndall.
Portable cases—3019—N. M. Marin.
Powder flasks—2198—C. M. Fontenoy and J. N. Dopfeld.
Printing machines—3196—R. and H. Harrild.
Printing surfaces by photography, preparing—3113—R. H. Courtenay.
Projectiles—3204—F. Palmer.
Railway breaks—3077—J. and W. Kitchen, and S. Samuels.
Railway crossings—3202—J. and E. Firth.
Railway engines and carriages, connections between—3164—W. Butler and A. Dalgety.
Railway trains, signalling apparatus for—3182—J. Smeeton.
Railways, fog signals upon—3166—T. Barker.
Reaping machines—3031—T. Wardlaw.
Roads—3379—W. H. P. Gore and R. Gore.
Rugs, &c.—2885—E. Huxley.
Safety lamps—3045—E. Thomas.
Salts of soda and potash—3097—J. K. Leather.
Shades—3085—F. Tyerman.
Smoky chimneys, preventing—3188—D. S. Chater.
Submarine excavations—3025—W. E. Newton.
Sugary substances, saccharatifying—3146—E. T. Hughes.
Telegraphic despatches, confirming—2977—E. J. Payne.
Textile fabrics, cleansing—2967—W. S. Macdonald.
Vessels' holds, discharging bilge water from—3176—A. Hermann and H. Brethauer.
Vessels, raising sunken—3067—T. McComas.
Wadding—3103—W. E. Gedge.
Water, purifying—3055—C. J. Wahab.
Weaving, looms for—3190—E. L. Paraire.
White lead—3133—W. R. Lake.
White lead—3180—H. A. Bonneville.
Yarns—3115—J. H. Johnson.

Invention with Complete Specification Filed.

Nails—3328—W. R. Lake.

From Commissioners of Patents' Journal, December 25th.

Patents on which the Stamp Duty of £50 has been Paid.

3208. F. N. Gisborne.	3242. J. H. Johnson.
3218. R. H. Taylor.	3256. J. H. Johnson.
3219. R. Paterson.	3263. H. P. Forrest.
3212. J. Howden.	3290. H. Caunter.
3216. W. Clark and W. F. Batho.	3291. D. Naylor.
3240. J. Gjers.	3246. J. Ronald.
3273. J. Gjers.	3253. W. E. Newton.
3223. J. Green.	3254. S. B. Ardrey, S. Beckett, and W. Smith.
3224. E. J. Green and R. Mason.	
3241. A. Turner.	3261. S. S. Gray.

Patents on which the Stamp Duty of £100 has been paid.

2883. G. S. Goodall.	2992. H. Cochrane.
2896. J. Willcock.	2990. J. Whitworth.
2906. J. H. Johnson.	2975. T. S. Cressey.
2918. A. V. Newton.	2963. X. C. de Nabat and A. C. de Nabat.
2967. S. King.	

Journal of the Society of Arts.

FRIDAY, JANUARY 4, 1867.

Announcements by the Council.

ORDINARY MEETINGS.

Wednesday Evenings at Eight o'clock :—

JANUARY 16.—"On Mercantile Marine Legislation, as affecting the Number and Efficiency of British Seamen." By Captain TOYNBEE, F.R.A.S.

JANUARY 23.—"On the Iron Permanent Way used on German Railways." By T. A. ROCHUSSEN, Esq.

JANUARY 30.—"On Artificial Illumination." By D. N. DEFRIES, Esq.

CANTOR LECTURES.

The following is the syllabus of the course of Six Lectures "On Pottery and Porcelain," illustrated by specimens of various manufactures, and by photographs and diagrams, to be delivered by William Chaffers, Esq. :—

LECTURE I.—MONDAY, JANUARY 21, 1867.

ANCIENT POTTERY.—Introduction. Assyria and Chaldea, Egypt, Greece, Etruria, Rome, &c.

LECTURE II.—MONDAY, JANUARY 28.

MAIOLICA.—Italy, Spain, Persia, &c.

LECTURE III.—MONDAY, FEBRUARY 4.

FAYENCE.—France, Spain, Portugal, Russia, Sweden, Denmark, &c.

GRÈS OR STONE WARE of Germany and Flanders.

DELFT WARE, &c.

LECTURE IV.—MONDAY, FEBRUARY 11.

ORIENTAL PORCELAIN.—China, Japan.

LECTURE V.—MONDAY, FEBRUARY 18.

EUROPEAN PORCELAIN. — Italy, Germany, France, Holland, Belgium, Russia, Poland, &c.

LECTURE VI.—MONDAY, FEBRUARY 25.

ENGLISH POTTERY AND PORCELAIN.—Early History, continued to the beginning of the 19th century.

The lectures will commence each evening at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend to each lecture.

A new list of members of the Society has been printed, and any member can have a copy sent to him on application to the Secretary.

SUBSCRIPTIONS.

The Christmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

PRIZES TO ART WORKMEN.

The works sent in competition for the Prizes offered this Session will be placed in the Great Room, for the inspection of Members and their friends, on and after Wednesday next.

The following is a catalogue of the works received :—

FIRST DIVISION.

WORKS TO BE EXECUTED FROM PRESCRIBED DESIGNS.*

1. CARVING IN STONE.—Panel, after chimney piece by *Donatello*, by J. Daymond, Jun., 4, Edward-street, Vauxhall-bridge-road, S. Price £8.
2. Ditto, Gothic bracket, by E. J. Price £5.
3. Ditto, by John Edward Daly, 33, Medway-street, Westminster, S.W. Price £15.
4. Ditto, by John Barker, 4, John-street, Marlborough-road, Chelsea, S.W. Price £12.

*5. Flowers carved in Caen stone, by W. H. Holmes, 101, Dean-street, Soho, W.

*6. Head, in marble, "Ecce Homo," by J. P. F. Jones, 4, Surrey-villas, Nunhead-green, Peckham Rye, S.E. Copies made for £5.

*7. Basso relievo, in marble, representing the Arts and Sciences, by the above. Price when finished £20.

*8. Ditto, in marble, by the above.

*9. CARVING IN STONE.—"Christ blessing little Children," by H. Francis, Reigate-heath, Surrey.

*10. Ditto, "First Steps in Life," by the above.

*11. Ditto, specimens of letter-cutting in stone, by the above.

*12. MODELLING IN PLASTER.—National emblems, arranged by J. Daymond, Jun., 4, Edward-street, Vauxhall-bridge-road, S. Price £8.

*13. HEAD IN CAEN STONE.—"Winter," by T. Herne, 22, Werrington-street, Oakley-square, N.W.

14. CARVING IN WOOD, after design by *Holbein*, by T. E. Mayle, 33, James-street, Stockwell, S.

*14*a*. CARVING AND GILDING.—A Glass Frame, designed and carved by W. M. Holmes, principal part of the Flowers by Mouatt (deceased), gilt in double mat and burnished by Messrs. Buchholtz, Venning, Chowne, sen., Ettershank, Connor, and Allen; exhibited by J. H. Wyatt, 101, Dean-street, W.

15. REPOUSSÉ WORK IN METAL.—Executed in iron, after the Martelli bronze mirror case at South Kensington, by G. Page, 39, Duglas-street, Northampton-road, Clerkenwell, E.C. Price £20.
16. Ditto, by J. S. Nicholls, 4, Everilda street, Hemingford-road, Islington, N. Price £5.

16*a*. Ditto, on silver cup, by X. Y. Z. Price £30.

17. Ditto, on silver, by V. U. (Unfinished.)
18. Ditto, "Raphael's Three Graces," in silver, by Joseph Hakowski, 59, Frith-street, Soho-square, W. Price £20. Copies at £15.

18*a*. Ditto, "Three Graces," in silver, by X. Y. Z. Price £12.

19. Ditto, "Three Graces," in copper, silvered, by Charles Yerman, 14, Gerrard-street, Islington, N.
20. Ditto, "Three Graces," in copper, by Alexander Dufour, 36, Cleveland-street, Fitzroy-square, W.
21. Ditto, "Three Graces," in copper, by W. Holliday, 14, Nailour-street, Islington, N. Price £15.

*22. Ditto, Portrait of the late Viscount Palmerston, by the above. (Sold.)

*23. Ditto, Group, in copper, "Abundance," after *J. Van Eycken*, by Thomas James Bowman, 3, Rheidol-terrace, St. Peter's, Islington, N. Price £7 10s.

*23*a*. Ditto, "Raffle-leafage." Price £5.

* Those marked with an asterisk (*) are not after the prescribed designs.

24. Hammered Work in Brass.—Adapted for use as a bracket, by W. Mansfield, 72, Bishop's-road, Camberwell New-road, S.
25. Ditto, by E. Millward, 35, Little Clarendon-street, Somers-town, N.W.
26. Ditto, by Albert Edward Millward, 13, New Compton-street, Soho, W.

27. Hammered Work in Iron.—Ditto, by Alfred Millward, 35, Little Clarendon-street, Somer's-town, N.W.
28. Ditto, by G. H. Price £5 10s.
29. Ditto, by James Gwillim, 19, Sidney-square, Mile-end, E. Price £15.
*30. Ditto, by the above. Price £20.
30*a*. Panel for a screen, by W. Letheren, Lansdown Iron Works, Cheltenham.
*31. Ditto, by William Cunliffe, St. Peter's-street, Burnley. Price £5 5s.
*32. Ditto, Bread-basket, designed by A. W. Blcomfield, Esq., architect, for East Sheen Church; executed by T. Winstanley, 7, Stanhope-street, Clare-market, W.C. Price £12.

33. Carving in Ivory.—Medallion portrait of Flaxman, by J. W. Bentley, 22, Sherwood-street, Golden-square, W. Price £10.

34. Chasing in Bronze.—Bust of "Clytie," by Frederick Beech, 52, Great Colmore-street, Birmingham. Price £16 16s.
35. Ditto, by H. R. Batchelor, Jun., 149, St. John-street-road, E.C. Price £14.
36. Ditto, by T. Nichols, 4, Everilda-street, Hemingford-road, Islington, N. Price £15.
37. Ditto, Ornament, after *Goutier*, by R. Reynolds, 15, Oak-village, Kentish-town, N.W. Price £15.
38. Ditto, Ornament, after *Goutier*, by G.
39. Ditto, Ornament, after *Goutier*, by H. J. Hatfield, 16, Alfred-street, Tottenham-court-road, W.C. Price £15.
*40. Ditto, Statuette of "Caractacus," by the above.
*41. Ditto, Group, "Jacob Wrestling with the Angel," by the above.
*42. Two miniature frames, raised and chased by the above.
43. Engraving on metal, after arabesques, by G. S. B. Price £3 10s.
44. Ditto, by G. Berry, 31, Brewer-street, Golden-square, W. Price £4 4s.
45. Ditto, by William Rowe, 4, Larkhall-lane, Clapham, S. Price £3.
*46. Ditto, by Gilles McKenzie, Tudor-street, Sheffield.
*47. Ditto, by the above.
*48. Ditto, by the above.
*49. Ditto, on silver cup, by the above.

*50. Enamel Painting on Copper.—"Madonna and Fish," after *Raphael*, by Frederick Lowe, 13, Wilderness-row, E.C.
*51. Ditto, "Boy and Doves," after *Raphael*, by Walter J. W. Nunn, 10, Gardour-street, Bromehead-street, Commercial-road, E. Price £5.

52. Painting on Porcelain.—"Two Children," in *Raphael's* cartoon of "Lystra," painted on a vase, by Edwin Saunders, Messrs. Battam and Son, Gough-square, E.C.
53. Ditto, "Two Children," painted on a vase, by W. J. W. Nunn, Messrs. Battam and Son, Gough-square, E.C.
54. Ditto, "Two Children," by F. D. Bradley, West-parade, Mount-pleasant, Stoke-upon-Trent. Price £4 4s.
55. Ditto, "Two Children," by John Slater, Field-place, Stoke-upon-Trent. Price £3 3s.
56. Ditto, "Two Children," by William Slater, Field-place, Stoke-upon-Trent. Price £3 10s.
57. Ditto, "Two Children," by William H. Slater, Oakhill-cottages, Stoke-upon-Trent. £5 10s.
58. Ditto, ornament, by F. D. Bradley, West-parade, Mount-pleasant, Stoke-upon-Trent. £5 5s.
59. Ditto, Ornament, by Alexander Fisher, 5, Clyde-street, Stoke-upon-Trent.
*60. Ditto, Ornament, plateau in blue, after design by *Maestro Ludovico*, by the above.
*61. Ditto, Pair of door finger-plates, majolica style, by Miss L. Leila Hawkins. Price £5 5s.
*62 & 63. Ditto, Circular-plates, subjects from the "Signatura" ceiling, by W. P. Rhodes, School of Arts, Stoke-upon-Trent.

64. Decorative Painting, Ornament, by John Slater, Field-place, Stoke-upon-Trent. Price £3 3s.
65. Ditto, by Δ.
66. Ditto, by Charles Pfänder, 28, Bayham-street, Camden-town, N.W. Price £6 5s.
67. Ditto, after a picture frame in the South Kensington Museum, by the above, £13 10s.

68. Wall Mosaics, after *Bertini* of Milan, by Samuel Cooper, 2, Waterford-terrace North, Walham-green, W.

69. Die Sinking, after *Wyon's* "Head of Prince Consort," by W. E. Bartelle, 4, Chichester-place, Wandsworth-road, S. Price £15.
70. Ditto, by J. W. Minton, 9, Royal Mint, E.C. Price £20.
71. Ditto, by Albert Heness, 3, Egbert-street, St. George's-road, N.W. Price £10 10s.

72 Glass-blowing.—Exhibited by Dr. Salviati, 431, Oxford-street, W. Produced by Marco Seguso, of Murano.

73. Bookbinding.—After an Italian specimen, "Quintus Curtius," by John Jeffrey, 23, Upper Marylebone-street, W. Price £7.
*74. Ditto, Early Florentine style, "Histoire de la Porcelaine," by Louis Genth, 30, Brydges-street, Covent-garden, W.C. Price £35.
*75. Ditto, "Œuvres de Lorize Labe," by the above. Price £8 8s.
*76. Ditto, case specimen of Mosaic, by the above, £10 10s.

77. Illuminations.—Specimen by Charles Pfänder, 28, Bayham-street, Camden-town, N.W. Price £5 10s.
78. Ditto, by Miss Mary R. David, 4, Anderson-street, Chelsea, S.W. Price £5 5s.

SECOND DIVISION.

Works to be Executed without Prescribed Designs.

Wood Carving.—(*a.*) *Human figure in the round, in alto or in bas relief. Animals or natural foliage may be used as accessories.*

79. "Egeria," by J. W. Gould, 33, Bayham-place, Camden-town, N.W. Price £15.
80. "Cynthia," by the above. Price £10.
81. "Autumn," Female Head in satin wood, by G. F. Bridge, 3, Vincent-square, S.W. Price £5 10s.
82. A Finial carved in oak, by R. Davison, 28, Winchester-street, South Belgravia, S.W.
83. Original Group in walnut, "Wallace at the Battle of Stirling," by John Lucas, 82, Long-acre, W.C. Price £31 10s.

(*b.*) *Animal or still-life. Fruit, flowers, or natural foliage may be used as accessories.*

84. "Dog's Head," by E. Dujardin, 46, Camberwell-grove, S. Price £2.

(*c.*) *Natural foliage, fruit, or flowers, or conventional ornament, in which grotesque figures or animals may form accessories, preference being given where the work is of an applied character for ordinary decorative purposes, as representing commercial value.*

85. Panel. "Bird and Flowers." by E. Dujardin, 46, Camberwell-grove, S. Price £10.
86. Panel in Lime Wood, by J. S. Booth, 19, Malden-road, Kentish-town, N.W. Price £10 10s.
87. Chemera Truss Leg, by R. Baker, Messrs. Holland and Sons, Gillingham-street, Pimlico, S.W.
88. Vase of Flowers and Conventional Bracket, by G. H. Bull, 16, Millman-mews, Millman-street, W.C. Price £23.

89 & 90. Design for Damask Table Linen, by Miss A. Kemp, 27, Hereford-square, Brompton, S.W. Price of No. 89, 15s.; No. 90, 10s.
91. Design for a Book Cover, by Miss Mary R. David, Price £1 10s.
92 & 93. Designs for Damask Table Linen, by the above. Price 10s. each.
94 & 95. Works in Oil, by Charles Maiben, 40, West Hill-street, Brighton.

Works Executed and Finished by Machine.

Exhibited by Charles J. Hill, 6, Albany-street, Regent's-park, N.W.:—

96—98. Three Groups in Ivory. Price £15.
99. "Head of H.M. the Queen," in Ivory. Price £5.
100. "Greek Head" in Steel. Price £8.
101. Ditto, in Malachite. Price £5.
102. Case with Two Proofs from Engravings on Steel for Surface Printing, and two "Medusa's Heads." Engravings and dies in hand. Price £4 each.

Proceedings of the Society.

Food Committee.

The first meeting of this Committee took place at the Society's House, on Friday afternoon, 21st Dec., Mr. Hugh C. E. Childers, M.P., in the chair. There were also present Mr. John Bell; Mr. Harry Chester; Mr. W. Ewart, M.P.; Mr. W. H. Michael; Lord Robert Montagu, M.P.; Mr. F. Parish; Mr. F. S. Powell, M.P.; Mr. Benj. Shaw; Mr. Edward Wilson; Mr. G. F. Wilson, F.R.S.; and the Rev. C. Wright.

Mr. Harry Chester, having been requested by the Chairman to open the proceedings by an explanatory statement, commenced by saying that, when he moved in the Council of the Society of Arts for the appointment of this Committee, to investigate the very grave and difficult questions with which it was to deal, he was well aware that they could not be satisfactorily dealt with except by a committee selected with more than ordinary care, and presided over by a chairman more than ordinarily capable of guiding them by his experience and wisdom. He was happy to say that the composition of the Committee left nothing to be desired; and that the Chairman of the Committee, the Right Hon. Henry Austin Bruce, M.P., was singularly well-fitted for his post. The subject of the food of the people had for some time past occupied the attention of the Council of the Society, and the circumstances of the present day made it more than usually expedient to take some more definite action upon it. They were all aware that the Privy Council and other public authorities had published statements showing that the people of this country were insufficiently fed; that there was a great want of sufficiently nutritive food. This was not merely a question of humanity and charity; it was a very grave national question, vitally affecting "arts, manufactures, and commerce," and the very sources of national strength. The first thing was to see clearly in what directions this committee could usefully act, and what it must necessarily avoid. Nothing must be done to interfere in any way with the operation of the laws of political economy, nor with the natural action of trade; but the Society of Arts might in this as in other matters do good service by ventilating the subject, by collecting and distributing information, by repeatedly calling attention to the principal needs and the best suggestions for supplying them, by offering medals and premiums for various inventions of improved processes, and generally by bringing the resources of science to bear on the wants and difficulties of those branches of arts, manufactures, and commerce, which are concerned in the production, importation, preservation, and preparation of articles suitable for food. His hope that this was a subject with which the Society of Arts might usefully deal had been greatly encouraged by the cordial manner in which those noblemen and gentlemen who had been invited to serve on the committee had responded to the invitation. The most lively interest had been expressed; and the two or three who had declined to serve had given sufficient reasons for so doing. It would no doubt be observed that, with the single exception of Professor Bentley, a member of the Council, there were no medical men on the committee. This arose from no inability to appreciate the importance of medical knowledge and experience in such a matter, nor from any unwillingness on the part of the medical profession to assist the Committee. From many of the most distinguished members of that profession the heartiest offers of assistance had been received; but the truth was, that the medical experts were so numerous, and perhaps the differences of opinion among them were so considerable, that, if any were invited to serve on the Committee, it would be invidious to select a few, and not desirable to appoint many, for this might give too professional a character to the Committee; it was therefore resolved to seek their assistance rather as witnesses than as judges; and to invite them to state in writing or *viva voce* the results of their knowledge and experience. The Committee had been promised a great deal of very valuable assistance of this kind by many distinguished members of the profession. It would be very important to give the utmost possible publicity to the proceedings of the Committee, and to the suggestions with which it might be favoured. He hoped that henceforth, for some months, every number of the Society's weekly *Journal* would contain some publications from the Committee, so that the subject might be kept constantly in view. The Society had more than 3,000 members, and a large number of Institutions and Local Educational Boards in union with it. To all of these the *Journal* was sent regularly, and it would also be sent to each member of this Committee, whether a member of the Society of Arts or not. He suggested that the co-operation of the principal medical journals, and of the press generally, should be invited. Slips of what the Committee proposed to publish in the Society's *Journal* might be sent simultaneously to all such journals as might be willing to assist in ventilating the subject. The Board of Trade was in possession of a vast amount of valuable information upon points into which they would have to inquire; and he was authorised by Sir Emerson Tennant to say that all such information, and all such assistance as that Board could afford, would be most cordially afforded to the Committee. The Secretaries of State for Foreign Affairs, the Colonies, and India, would doubtless assist the Committee by circulating queries among her Majesty's ministers and consuls, governors, and other functionaries, respecting articles suitable for food, or modes of preparing it, which might be useful to this country. The

Acclimatisation Society had already received some valuable information of this kind through the Foreign Office, and he was sure that that Society would readily place it at the disposal of this Committee. The subjects of inquiry might be said to be of almost unlimited extent, and it was desirable to indicate at the outset a few great divisions of the subject on which it might be most useful at first to enter. It would not be well to enter upon such branches of the subject as were calculated to excite popular prejudices, such, for example, as the introduction of horse-flesh as an article of food for the lower classes. The Committee were aware that this was a subject of great interest just now at Paris. It might or might not hereafter become popular in this country, but at present the mere mention of it would tend to excite an uncontrollable prejudice against the Committee. There were four great subjects with which he thought the Committee might advantageously begin to deal:—Meat, fish, milk, cooking. The first great principle, he had almost said, of Christianity as well as of political economy appeared to be that all the world should be kin, that each part of the world should contribute to supply the wants of the rest. The home supply of meat for the population of these islands was not nearly sufficient for the due sustenance of one-half of the population. The supply of live cattle from foreign parts could never be equal to the want. Fresh meat in the natural condition could only be procured from foreign countries to a limited extent, that is, from neighbouring countries, and in favourable weather. On the other hand, millions of tons of beef and mutton were wasting in distant quarters of the earth; and science was required to devise means for so dealing with that beef and mutton that commercial enterprise might be enabled to bring it to this country in a condition suitable for food. This was an object of enormous importance. It had long occupied the attention of the Society of Arts. In 1853, when delivering the centenary address, as Chairman of the Council, he (Mr. Chester) had alluded to it, and asked why Australia should export only the wool and tallow of the sheep, and not the mutton itself to the hungry masses in this country. Of late years, no session had passed without the Society's taking some measures to call public attention to this subject. Almost every patented and other invention for preserving meat had been described, and many of them had been exhibited, in the Society's great room. In 1863 the Society had offered a medal and a prize of £70 provided by the liberality of Sir W. C. Trevelyan, a member of the Society.* Various claims had been submitted to the Council, but no award had hitherto been made; and he understood that the Council would be glad of the assistance of this Committee in making the award. To this important point, then, their attention would be turned at once. They saw daily advertised not fewer than three different kinds of *extractum carnis*, all claiming to be Liebig's *extractum*. He believed that there was not much doubt as to which of the three was the genuine article; but the Committee might might cause them all to be analysed, and might give the results to the public. So much attention had lately been given to the importance of preserving and increasing the supplies of fish, that he need merely to indicate that snbject as one which would abunduntly reward inquiry. Mr. Ewart, and other members of the committee who flourished in the ante-railway period, must remember the immense vans, with high wheels, that used to bring fish daily to London from the Kentish and Suffolk ports. They were thought to travel at a wonderful rate, and they were called into existence by the Society of Arts, which had offered medals and prizes, and otherwise excited a spirit of enterprise "for the better supplying of the metropolis with fish." The better supply of milk was a vital question. He did not now allude to that fearful source of mortality among the infant poor, the deficiency of breast milk. He alluded to the fact that, as a general rule, the working classes of this country, even in dairy districts—and perhaps more there than elsewhere—were unable to procure the milk diet which was necessary to the growth of healthy bodies. In some districts there was an absolute insufficiency of milk; in others there was an abundance of it, but it was turned into butter and cheese, and the poor could get none to drink. He believed that the Ladies' Sanitary Association had published some useful suggestions for dealing with the latter case; and, if so, the Society of Arts might with advantage give additional publicity to those suggestions. There was plenty of kind feeling in England, but people did not always know "how to do it." It had struck him as somewhat unfortunate that, while the supply of milk, as milk, was insufficient for the wants of the people of England, such large quantities of English milk should be converted into cheese. Cheese, of course, was a valuable article of food, very nutritious to those who could digest it; but cheese might be brought from a distance, while milk could only be consumed, as milk, within a very limited area. Mr. J. C. Morton in his paper on "London Milk," last session,* had stated that the quantity of milk consumed by the three millions of London people was less than half the amount that, according to a good standard of food, they ought to consume; also that this was true of a very wide extent of agricultural populations; that the transit of milk by railway was injurious to it; and that consequently country-raised milk was worth less per gallon in London than London-raised milk. He gave a table showing the milk-consuming rate of various populations, and it appeared that in Devonshire the quantity of milk consumed was considerably greater per head than in any other English county. Could this superiority be a result of the common Devonshire practice of preserving the milk by clotting it? He thought that the Society of Arts might usefully press on the railway companies and milk producers the great importance of improving the present very unsuitable milk vans on which that delicate and valuable commodity was now savagely transmitted to the metropolis. He thought also that the Society of Arts might offer its medal and a valuable premium for the best method of preserving milk, so that it might be sent from greater distances than at present. Much milk, which was now necessarily converted into cheese, because it could not be kept from spoiling as milk, might then be more beneficially and profitably consumed as milk. Mr. Foster had told him of a French invention for the preservation of milk; and said that he had tasted some milk thus preserved for three years, which was perfectly sweet, and could not be distinguished from fresh milk. The Committee would do well to acquaint itself with that invention; and, if it were open to any serious objection, the Society might do good service by offering a medal and a valuable prize for a better method of preserving milk. He knew that, after all, the commercial principle, the hope of gain, was the best stimulus to invention: but all experience showed, the experience of the Society of Arts proved to demonstration, that these offers of medals and prizes had useful effects. To this day the medals granted at the Exhibition of 1851 were paraded in advertisements of all sorts of articles that were offered for sale; and this was done not merely by petty chapmen of no reputation, but by tradesmen and manufacturers of world-wide eminence. An article *medalled* by the Society of Arts was sure to command a market. On the subject of cooking he would

* The terms of the offer are as follows:—"The sum of £70, placed at the disposal of the Council by Sir W. C. Trevelyan, Bart., with the Society's medal, is offered for the discovery of a process for preserving fresh meat better than by any method hitherto employed, applicable to the preservation of meat in countries where it is now almost valueless, so as to render it an article of commerce and available for stores on ship board. Specimens, with detailed accounts of the process employed, must be sent to the Society."

* *Journal*, vol. xiv. p. 65.

not say many words. The Committee well knew how deplorable was the cooking among the lower, indeed among all but the highest, classes in this country. A valuable paper* had been read and well discussed before the Society of Arts, on the admirable system of "Cooking Depots," introduced at Glasgow by Mr. Corbett. That was one of the greatest boons that had been conferred on the working classes. The same system had been introduced successfully at Manchester. An attempt had been made in London, but unhappily without success. He believed that it had failed, so far as it had failed, from no inevitable causes, from no local peculiarities. There seemed to be no reason why the same system should not be carried out, on a very extended scale, in London as elsewhere; and the Committee might do a good work in collecting and collating experience on the subject, and in calling attention to it, until a second Mr. Corbett should arise with wisdom and energy enough to acclimatise the Glasgow product in the metropolis. The Committee might also represent to the Committee of Council on Education the great importance of providing instruction in cooking for the poorer classes. This surely was a subject well worthy of the notice of Her Majesty's Inspectors of Schools. This was a matter which the Society of Arts had long regarded as important. In the Society's great scheme of educational examinations, designed to encourage the education of adults among the working classes of both sexes, domestic economy held a prominent place. In that subject the Dean of Hereford was examiner. In his outline of the examination for 1867, were included "the nutritious properties of food, animal and vegetable; modes of cooking, &c.," and a benevolent member of the Council, Mr. T. Twining, had taken measures to supply a systematic course of lectures to the working-classes in different parts of London. Having particularised these four great subjects of meat, fish, milk, and cooking, he would not longer detain the committee, though he was aware that there were an almost infinite number of other useful subjects which might be specified. There were, for example, the great cereal class, vegetables of various kinds, as well as fruits, little known, but capable of being much used in this country, and that scandal of civilisation, the adulteration of food. He would now propose that the Chairman, Mr. Bruce, should be supported by two Vice-Chairmen, who might take the chair in his absence, or at Sub-Committees; and he would move that Mr. Childers, M.P., and Mr. Benjamin Shaw, a member of the Council, be the Vice-Chairmen.

This motion having been seconded was carried unanimously.

The following gentlemen were then appointed a Sub-Committee to collect information and materials, and generally to prepare for the transaction of the business of the Committee when it shall meet in February, viz.:—The Right Hon. Henry Austin Bruce, M.P., Chairman of the Committee; Mr. Childers, M.P., and Mr. Shaw, Vice-Chairmen; Professor Bentley, Mr. Harry Chester, Mr. Michael, Mr. Consul Parish, and Mr. Edward Wilson.

A general conversation respecting the objects of the Committee, and its modes of proceeding, then followed; in the course of which Mr. Michael described an invention for preserving milk which he thought successful. The milk was dried in oscillating vessels; and in that state was easily transportable, and might be kept for a long period. This method had been successfully adopted at Lord Northbrook's, and was about to be introduced on a large scale at Zurich in Switzerland.

Mr. Harry Chester said that probably that invention was little known; and, if it were really valuable, this Committee might direct attention to it, but all plans for drying milk were somewhat elaborate and costly; and what he had principally in view in his remarks on milk were means for preserving it, not during long voyages, but during such brief periods as would allow milk in its natural state to be sent to London, for example, from greater distances than was possible at present.

Mr. Bell said that, remembering the caution which they had received against running foul of popular prejudices, he would say nothing about edible snails, though the Committee knew that many drooping lives had been saved in foreign countries by the use of that singularly restorative diet. He hoped, however, that the great family of molluscs would not be entirely overlooked by the Committee, and he drew attention to various other articles much used as food on the Continent, but little known in these islands.

Mr. Shaw enlarged on the great importance of the objects for which the Committee had been formed. He said that, from his conversations on this subject with many medical men of eminence, he felt assured that any material improvement in the diet of the people would show itself unmistakably in their health and strength; and would not only enable them to resist better than at present the attacks of cholera, typhus, and other epidemics, but would diminish sensibly the mortality from consumption, heart disease, and other maladies which were in a great degree the consequences of an imperfect nutrition.

The Committee then adjourned.

The sub-committee met on Friday, the 28th Dec., at 4 o'clock; and is to meet again this day, Friday, at 3 o'clock.

The following memorandum has been furnished by a member of the Committee:—

Mr. Simon, the principal medical officer of the Privy Council, says, "That no sanitary necessity can be more real than the common animal need of proper food—that no morbific influence can be of worse import to life than mere privation of nourishment. These are propositions which every one feels to be true, when they are illustrated in individual cases of death by starvation, or in those national extreme sufferings of scarcity which constitute famine. But the propositions are not exclusively true in that utmost range of their application. In degrees far short of what is popularly known as starvation or famine, insufficiency of nourishment may bring very hurtful consequences to health. Local defects or local peculiarities of diet may exercise important influence in determining or colouring particular localisations of disease; and, generally, it may be said that, in order justly to estimate the sanitary circumstances of a people, scientific regard must be had to the quantity and quality of the people's meat and drink."

This being so, let us see what are the facts in respect to large classes of the English people.

In 1863, the Privy Council ordered an inquiry to be made into the diet of the lowest-fed classes of the population, and in order to take the most moderate standard of comparison, the estimate adopted as to the minimum quantity of food on which life could reasonably be expected to exist was derived from what had been adopted as a practical rule for allowances to the poor during the cotton famine in the North. The rule then laid down was that, to avert starvation diseases, the weekly food of an average adult must contain at least 28,600 grains of carbon and 1,330 grains of nitrogen. The annexed table (see next page), therefore, speaks for itself:—

In only one of the examined classes of indoor operatives did the average nitrogen-supply just exceed, while in another it barely reached the estimated standard of bare sufficiency, and in two classes there was defect—in one a very large defect—of both nitrogen and carbon.

Turning from these to the agricultural population, we find that the inquiry tended to show that more than a fifth of the examined cases had less than the estimated

* *Journal*, Vol. xi., p. 199.

Class.	No. of Families examined.	Average weekly supply for each adult.	
		Carbon.	Nitrogen.
Silk-weavers	42	27,620	1,151
Needlewomen.....	31	22,900	950
Kid-glovers.....	10	28,623	1,213
Shoemakers.....	21	31,700	1,332
Stocking-weavers ..	21	33,537	1,316
Average.....		28,876	1,192
Minimum allowance advised for unemployed cotton operatives		28,600	1,330

bare sufficiency of carbonaceous food, while in three counties insufficiency of nitrogenous food was the average local diet.

These results are put forward by Mr. Simon as approximate only, but in their general character they derive abundant confirmation from other testimony, and there can be little doubt that their substantial truth is beyond question.

Dr. Brown, in a little work on "The Food of the People," published 1865, says:—"The plague-spot, the skeleton in the closet of England is, that her people are underfed. When I make this declaration it will be at once understood that in speaking of people, I do not speak of the upper classes, of the middle class, or of highly-skilled artisans, who may be said to be in a state of transition—to be passing from the labouring into the middle class. I speak of the strictly labouring class and their families. My opportunities of observing this class have been by no means narrowly limited. For a long series of years I have been physician, and I trust not an unobserving one, to two great charitable institutions, each of them in a populous sea-port, comprising various manufactories, and, of course, many of the labouring class—the Sunderland Infirmary and Dispensary, and the South Shields Dispensary. In my attendance on these charities I have observed, and not without a feeling of pain, the diminishing power of English women to suckle their offspring," p. 2. Coming to the defective constitution resulting from this under-feeding, he observes:—"It is transmissible from sire to son, and is the great instrument in producing that deterioration of a race . . . which is the concomitant and cause of the decay of states. . . . We must all see that England requires for the security of her shores a well-fed and vigorous people, and that all the thought and energy she can boast should be employed for a time on the food question." p. 10.

Dr. Blakiston, of St. Leonards, in his recent work, "Clinical observations on diseases of the Heart, &c.," says:—"I cannot conclude this subject without offering a few remarks on the prevention of diseases. It has been seen that those under consideration, in common with many others, arise from a morbid state of the blood. Setting aside the influence of hereditary transmission and individual habits of life, it is clear that the condition of the blood mainly depends on that of the air breathed and the food consumed. Great efforts are being made to purify the air by improvements in drainage, ventilation, and the construction of dwellings; and much attention is bestowed on the diet of the soldier and sailor, and of the inmates of workhouses and gaols, but that of the labouring classes generally, more especially as regards the consumption of animal food, is far from being in a satisfactory state. Is it not possible to increase this supply, and economise what we already possess? How can the members of our profession be better employed than by joining to promote this good work? First, by giving their aid and counsel to devise means for the supply of nutritious food, and for making the best use of that which is already within reach; and secondly, by assisting the clergy and laity to instruct the wives and families of the working classes to avail themselves of the advantages which may be afforded to them. By thus throwing ourselves heart and soul into this benevolent work, we shall increase our usefulness and raise our profession greatly in the estimation of the country at large."

PARIS UNIVERSAL EXHIBITION OF 1867.

British Section.

A distinct order of reward, of which particulars have already appeared in the *Journal*, has been "instituted in favour of persons, establishments, or localities, which, by a special organization or special institutions, have developed a spirit of harmony among all those co-operating in the same work, and have provided for the material, moral, and intellectual well-being of the workman."

These rewards consist of ten prizes, of the total value of 100,000 francs (£4,000), or £400 each, and twenty honourable mentions. One grand prize of 100,000 francs may, in addition, be awarded to the person, establishment, or locality, distinguished under this head, by a very exceptional superiority.

At the first meeting of the International Jury, held at Paris, 1st December, 1866, the following principles were adopted:—

1st. The Jury may doubtless take into account, among the facts presented for its consideration, the spirit of charity and beneficence; but it is not specially charged to reward acts of that character.

2nd. To constitute them the basis of a claim to reward, the facts adduced must have been the consequence of a free and spontaneous initiative, and not of legislative enactments.

3rd. It will not suffice that the work be praiseworthy in itself; it must at the same time be compatible with sustained and progressive prosperity.

4th. The circumstances of the position in which competitors may be found should be duly considered. To have maintained intact traditional circumstances of harmony and happiness, whilst progressing in agricultural or industrial pursuits, is a good ground of claim; but the introduction of improvements where antagonism and suffering previously existed is not less meritorious.

5th. The Jury has not thought it right to exclude from the competition individuals or societies which, although not engaged in agricultural or manufacturing pursuits, have founded durable and prosperous institutions, contributing to the propagation of good feeling and happiness, of which it is desirable to seek the best examples.

The following form must be filled up by or on behalf of any person, establishment, or institution, in the United Kingdom, for which the reward is claimed, and must be forwarded to the "Secretary, Paris Exhibition, South Kensington Museum," on or before the 20th January, 1867.*

I.—General Questions which apply to all cases:—

1. Name of the establishment:
   Where situated:
   Full postal address:
2. Name of the proprietor, or body of proprietors:
3. Name in full, description and address of the correspondent or Secretary of the Institution:
4. Principal object of the establishment:
5. By whom was it formed?
6. When was it established?

* It is desirable that the questions should be answered as far as possible; but it is not imperative that all should be filled up; and there are cases in which the whole are not applicable.

7. Have the works or the institution ever been suspended? if so, for how long, at what date, and from what cause?

8. State the number of persons at present employed, or received into the Institution—Adult males, ; females, . Young persons within the ages of and , males, ; females, . Children, males, ; females, . And the average number in each during ten years:

9. Are there any restrictions or qualifications for admission or employment in labour: namely,—

Age, and at what age? Instruction?
Apprenticeship, or other period of service?

10. What is the proportion of married females employed?

11. What regulations are made to enable them to attend to their family and domestic duties?

12. Are any arrangements made for the protection of young females whose employment necessitates their leaving home?

13. Has the establishment been remunerative or otherwise?

14. Is any pecuniary assistance received from the Government, or from any other body not participating in the profits? If so, define its nature and amount.

15. Has the establishment any special privilege, or monopoly of any kind, and what is its nature?

15*a*. Enclose a copy of all rules framed for the government of the establishment, or any information which may specially refer to it, and any plans of the buildings.

II.—Establishments where any description of Manufacture or Productive Labour is carried on, state—

16. Of how many partners does the establishment consist?

17. Is their pecuniary responsibility limited?

18. Is the capital divided into shares, or owned in parts? If so, how many, and of what amount, or in what proportions?

19. During the last five years, what has been the average yearly profit per cent., and in what proportion, and according to what principle, has it been divided among—

1. The partners, or shareholders.
2. The workpeople.
3. Any other person.
4. Devoted to capital, or other purposes?

20. What are the daily number of hours of work at the establishment, exclusive of meal-times?

21. What are the average weekly wages now earned?

By a family—
By a workman—
What are the highest weekly wages? What are the lowest?

22. Have any, and what, systems been adopted (payment by the piece or other) to stimulate the industry of the workpeople?

23. Have dwellings, at the cost of the establishment, been provided for the workpeople? Of what character? When erected? How many? And at what cost?

24. What are the average weekly rents paid for such dwellings?

By a family—
By a single workman—

25. Are any, and what, regulations made and enforced relative to periodical cleansing of the dwellings and workshops?

26. Is there any co-operative society, or arrangement amongst the workmen for the purchase of food or clothing, and how is the management provided and paid for?

27. Do the employers contribute in any way?

28. Is the system of truck in any form adopted? Are any payments made except in money to persons employed?

29. Is any provision made by the proprietors, or by the workpeople themselves, for medical attendance in cases of sickness; and are any, and what, allowances made to them, or in cases of death for their burial, and from what funds?

30. State the proportion, to the average of the locality, of the

Deaths of the workpeople employed—
Their marriages—
Births— Legitimate, ; illegitimate, .

31. State the average duration of life of the workpeople?

Adult males, . Adult females, . Children, .

32. State if any, and what, provision is made for the education of the workpeople and their children, and from what funds provided.

33. State what provision is made for their religious teaching.

34. State what provision is made for their mental or physical recreation.

35. Is any arrangement made to promote temperance, and what proportion of the workpeople avail themselves of it?

36. Are any plans adopted for taking charge of the savings of the workpeople?

37. How long have they been in operation?

38. What is the number of the contributors, and the average amount of their savings?

39. Are there any instances of savings invested in life assurance, and to what extent?

40. Have any, and how many, of the workpeople, by means of their savings, become possessed of houses?

41. Have they joined any trades' union, or formed any such union among themselves?

42. Have such unions had any, and what, influence upon their hours, or modes of labour, or their rate of wages?

43. Have there been any strikes among the workpeople?

44. State at what period? Of what duration? And the alleged causes?

45. By what means, and on what conditions, were they terminated?

46. Have any trade union interfered with the management of the establishment? And if so, give all particulars.

47. Has the establishment given rise to any hostile combinations among the manufactures or workpeople of the locality?

48. Has it had any, and what, effect upon the poor's rate of the parish?

III.—If the Establishment be one in which no Manufacture or Productive Labour is carried on, or forms part of the plan, state—

49. The express nature and objects of the institution.

50. By whom is it managed?

51. What is its gross annual income, and whence derived?

52. What are the annual expenses of management? And of collection where subscriptions are paid?

53. What are the number of paid officers?

54. And their salaries?

55. The conditions on which the inmates are commonly received, and the average duration of their stay in the institution.

56. The weekly cost of the inmates per head. If entirely, or in what proportion, it is defrayed from the funds of the institution, or in what other way.

57. Is any, and what, money allowance made to the inmates, and any, and what, gratuity given to them on leaving the institution?

58. State what has been the total yearly cost during the last five years?

59. Answer as in previous questions with regard to

Sickness (No. 29.)
Education (No. 32.

Religious Teaching (No. 33.)
Recreation (No. 34.)
Temperance (No. 35.)

60. What has been the average sum spent, under each of these heads, during each of the last five years?

61. By whom, and under what control, are the funds managed?

62. Have you any other information to offer on this subject, or in regard specially to your establishment?

Signed by { _____ *Owner.* / _____ *Manager.* / _____ *Public Officer of the Establishment.*

We certify that we are well informed of the management of the above establishment, and that we believe the foregoing statements to be true.

N.B.—The above certificate must be signed by at least two of the magistrates, or one magistrate and clergyman, or other well-known person residing in the locality.

NEW MUSEUMS IN FRANCE.

Rich as Paris and some other parts of France are in museums and public galleries, the list of these establishments will shortly be increased by three special museums of antiquities. After some delay, arising out of the requirements of the law respecting property belonging to minors, the authorities of the city of Paris have obtained possession of the Hôtel Carnavalet, in which is to be established a museum of civic antiquities and curiosities. It is situated at the east end of the town, in the Rue Culture Sainte Catherine, near the Place Royale, and, like the building in which is contained the famous museum of the Hôtel Cluny, has of itself a special antiquarian interest. It was erected soon after the year 1544, when Jacques de Ligneris, Lord of Crosnes, and President of the Parliament of Paris, purchased of the monks of the Val des Ecoliers five fields, in which to build a mansion. Pierre Lescot, Abbot of Clagny, furnished the plans for the building, which was erected by Jean Bullant. The work must have been pushed on with rapidity, for in the year 1547 the famous sculptor, Jean Goujon, was engaged on the decoration of the great door. Over the door, on the outside, was the coat of arms of the proprietor of the mansion, supported by two children; arms and trophies enriched the pediment, and over the key stone of the arch was one of those genii, or winged figures, in which Jean Goujon has never perhaps been equalled, certainly never surpassed, by any sculptor of modern times. In the vestibule is a figure of Fame, with two other winged figures above, bearing triumphal palm branches; and here were also two bas-reliefs of lions supporting the arms of the Ligneris family, all the work of Jean Goujon. The Fame and attendant figures still remain in their original position, but the lions were afterwards transferred by Mansard to the outside of the building, where they still are to be seen on the right and left of the pediment. Goujon also executed a colossal group, representing the four seasons, in the court-yard of the mansion. The ornamental sculptures were the work of Ponce Trébati, a Florentine sculptor. The Lord of Crosnes died in 1556, and the Hôtel Carnavalet remained only thirty years in possession of his family when it became the property of Françoise de la Baume, dame de Carnavalet, by whose name it has since been known. It remained in the lady's family about a century, when it was purchased by M. d'Agaurry, a rich magistrate of Dauphiny, who caused it to be restored and enlarged by the architect, Androuet du Cerceau; lastly, the edifice was again restored in 1634 by Mansard, the architect of Louis XIV.

For twenty years the Hôtel Carnavalet was the residence of Madame de Sevigny, and was the resort of all the wits of the period. At last it became the property of M. Verdot, who there established the institution bearing his name. It is now the property of the city of Paris, and its fine apartments will doubtless soon contain an interesting collection of civic antiquities and souvenirs. Several collections have been purchased, and presented for the future museum, and objects of interest are being constantly acquired. Amongst these is a picture representing the Hôtel de Ville and the surrounding buildings as they stood at the beginning of the sixteenth century, presented to the city by M. Vandermarcq, and a number of original designs of public works executed in Paris in past times. The Hôtel Carnavalet cost the city of Paris 900,000 francs (£36,000).

The city authorities have also just created a special bureau in connection with architecture, the fine arts, and public fêtes, with a view, apparently, of giving to the management of such matters more attention and administrative unity. M. Michaux, chef de bureau in the private office of the Prefect of the Seine, is appointed to this service.

The formation of a general museum of French antiquities in the old château of Saint Germain, which is being restored in the style of the original building, has already been mentioned in the *Journal*, and the work is expected to be completed in two or three years.

The establishment of a third new museum is only just announced. M. Viollet le Duc is engaged in restoring the curious old château of Pierrefonds, near Compiègne, by order of the Emperor, and it is said that another museum of antiquities will be established within what remains of that old feudal edifice which figures so often in the past history of France. When all these plans are completed, France will possess in its capital, and at two points at a considerable distance from Paris and from each other, three establishments for the preservation of the material records of her past history and art so long neglected, and now so studiously preserved.

The museum of Saint Germain will, probably, be confined to illustrations of the Gallo-Roman period, in which case, doubtless, the new museum of Pierrefonds will be devoted to more recent Gallic antiquities.

Fine Arts.

M. Hebert—the painter of several beautiful and well-known works, amongst which are "Malaria," "The Woman at the Well," and other charming studies of Eastern and Italian life, and many exquisite portraits, real and imaginary—has been appointed to succeed M. Robert-Fleury as Director of the French School in Rome.

Art and Art-Education in Paris.—The Municipal Council of Paris announces that, in order to prevent Parisian manufacturers from losing their well-earned reputation for works of elegance, the teaching of drawing is extended to 122 commercial schools, male and female, and to 32 adult schools. A sum equal to £33,466 is devoted to architectural works and the fine arts, of which amount nearly half is for decorative purposes.

Rouen Exhibition.—This exhibition, as before stated in the columns of the *Journal*, is one of the most important in France, and becomes more so every year—

the authorities of the town and the local society of the Friends of Art vying with each other in encouraging artists to exhibit in the old capital of Normandy, a country which has produced a large number of painters, and has furnished subjects for pictures innumerable. The exhibition which has recently closed was the largest yet opened by the society, and the sales have also exceeded those of any former year. The great gold medal, of the value of £40, was awarded to M. Charles Landelle, a painter whose style resembles somewhat that of M. Hébert, for a replica of a beautiful work, the "Fellah Woman," which was one of the attractions of the Paris salons last year, and which was purchased for the Emperor's private collection. There were six other gold medals given, the donors being—the Emperor, the Department of the Seine Inferieure, the town of Rouen, the Society of the Friends of Art, the Imperial Academy, and the Society of Emulation—all of Rouen; the Society of Horticulture gave a silver-gilt medal. The names of the other medallists will show that many eminent artists send their works to Rouen; they are, MM. Layerges, De la Rochenoire, Ribot, Achille Zo, T. A. Weber, Tabar; Mdlle. Morin (daughter of the Curator of the Museum of Rouen); MM. Cugnot, sculptor; L. C. Duchesne; and Madame Puyroche Wagner. The total amount of sales was about £1,600. The authorities of the town purchased for the Museum a fine picture of Stamboul, by Ziem; a beautiful landscape, by Daubigny; and three other works. The Society of the Friends of Art acquired forty-two works, amongst which were pictures by Weber, Zo, and other well-known artists, and a bronze figure of "Scapin," by Doublemard. Twenty-eight works were purchased by private persons, not members of the society. Such is the result of a few years' perseverance, and of the continued action of the authorities and of the friends of art. The provincial exhibitions of France now form a source of steady income for artists, and especially for those who are still struggling on, or gradually rising to eminence.

National Portrait Gallery.—The small rooms in Great George-street, Westminster, in which are still stowed away 225 portraits, were filled to overflowing by holiday-keepers during the Christmas week. On "boxing day" 860 people passed through the galiery. Their view of the pictures was of course hurried, but their conduct was orderly. At Christmas times a printed list of the portraits, including dates and the names of the painters, is presented gratuitously at the door. This synopsis of the larger catalogue is supplied, at the expense of the Government, from Her Majesty's Stationery Office. The most recent additions to the gallery are portraits of George III. and Queen Charlotte, by Allan Ramsay; Lord Lovat, by Hogarth; and a bust of Richard Cobden, by Woolner. The last is not among the purchases, but a donation. A replica of the bust has been sent to Paris. "Lord Lovat beheaded on Tower-hill" is the well-known engraved portrait. The execution is rude, but the character has been seized with the point and force peculiar to Hogarth. With the fresh acquisitions constantly made, the rooms in Great George-street become each year more inadequate to the display of the collection. Since the decision of the House of Commons last session to retain the pictures of the old masters in Trafalgar-square, the idea has naturally been revived of uniting under one roof the National Gallery and the National Portrait Gallery. Should this plan be adopted, changes in management and arrangement will be involved. It has sometimes been objected to such a measure that the object and character of the two galleries are dissimilar, that a portrait gallery does not regard merit in art, but solely authenticity in likeness. Yet whatever be the final decision, all agree that the existing and still growing collection now housed at Westminster must obtain more spacious quarters. The Gallery is only in its infancy. At South Kensington there will probably have been exhibited, in the course of the last, the present, and the coming year, not less than 3,000 portraits illustrative of English History. The collection now at Westminster does not reach 300. Persons most interested in the National Portrait Gallery hold the opinion that, could it obtain adequate space for expansion, its growth would become rapid.

British Architecture at the Paris Exhibition.—A preliminary exhibition has been held at Kensington, in the first room in the gallery recently occupied by historic portraits, of about 200 architectural designs. From this collection are selected from 40 to 50 drawings, which it is supposed may best represent, in Paris, the progress made by architecture in this country. Prominently among the designs so selected may be enumerated the following:—The Manchester Assize Courts, by Alfred Waterhouse; restorations of the London Guildhall, by Horace Jones, and of St. Stephen's Crypt, by Edward Barry; St. Giles's Schools, also by Edward Barry; Houses of Parliament, Sydney, by Mr. Lynn. Of Albert Memorials will be sent to Paris the non-accepted designs of Charles Barry, of James Fergusson, and of Professor Donaldson; while the design by Gilbert Scott, now in course of erection, will not be sent. Of Captain Fowke's design for completing the International Exhibition building of 1862; of the drawings for the new Museum of Science and Art, now in course of erection at South Kensington; and of the various designs for the projected Museum of Natural History at South Kensington, it does not appear that any record will be made in Paris. It does not seem that Captain Fowke or Godfrey Sykes will be represented. Still further, there are no designs by Mr. Gilbert Scott, Mr. Street, Mr. Hardwick, Mr. Burges, Mr. Butterfield, and some half-dozen other best-known architects. It has been stated, however, that certain additional drawings will be obtained, in order the more fully to represent the modern school of English architecture in the approaching Paris Exhibition.

Manufactures.

Sugar for Brewers.—The great scarcity of both English and foreign barley fit for malting purposes, has compelled some of the brewers to purchase low sugars for brewing purposes. That really fine barley will be a scarce commodity for several months, is evident from the damp condition in which the bulk of the crop has been secured. The result of an inferior crop of barley is, that the best parcels are worth 54s. and even 56s., and the best pale malt, so much required by the pale ale brewers, 80s. per quarter. With the exception of about 20,000 quarters of fine barley imported year by year from the Danish Islands, the whole of our vast supplies, from the Continent and elsewhere, are composed of qualities only fit for grinding and distilling purposes. Continental countries do not produce a quality of barley which can be converted into good saleable malt.

Mineral Waters.—The manufacture of mineral waters in Paris dates back about twenty years. The industry consists in the introduction into ordinary water of carbonic acid gas, formed by a mixture of sulphuric acid and chalk. The digestive action of aërated water, under the name of seltzer water, has brought it largely into use, and the consumer now finds it at hand in all cafés, restaurants, and wine-merchants. It is sold in syphons, in glass, or in stone bottles. An addition of sugar, lemon, or other flavouring substance, produces the ordinary limonade gazeuse, orangeade, and other analogous drinks, of which there is a large consumption in the cafés. There is also a great sale of effervescing powders, consisting of proportions of bicarbonate of soda and tartaric acid, in small packets, permitting the consumer to make his own gaseous beverages. This has given rise to the invention of different apparatus suited to the preparation of these beverages. In Paris there are six steam engines, of 47-horse power

in the aggregate, and 372 workmen employed in this manufacture. The extent of the wholesale trade carried on is about £80,000 per annum. New improvements are continually made in the apparatus and appliances used for preparing and bottling these waters. The sale of lemonade is one of the most prosperous in Paris. The number of *cafés* increases daily, and the restaurants, the singing saloons, and other places of public resort, for which Paris is noted, largely increases the consumption. In 1860 there were 2,200 vendors of lemonade and ices in Paris, employing 4,100 persons, and the annual sales reached £2,500,000.

The Iron Trade.—According to the ironmasters' returns, just made, the quantity of pig-iron produced in 1866 in Scotland was 994,000 tons, showing the striking decrease of 170,000 tons as compared with last year. The deliveries per railways, the shipments foreign and coastwise, combined with the local consumption, were 1,136,000 tons, and show a falling off, when compared with the preceding year, of 136,000 tons. As certified by the committee appointed by the trade, the stock of pig-iron is now 510,000 tons, thus exhibiting the marked decrease of 142,000 tons as contrasted with 1865. During the year the price has fluctuated from 82s.—the highest point reached in April—to 54s., the lowest to which it fell, in May, averaging 60s. 6d. per ton, against 54s. 9d. per ton last year. The malleable iron-works, the foundries, the ship-building yards, have felt the languor of the depressing influences which generally prevail. Taking into consideration the steady annual accumulation of the wealth and resources of the British Empire, there is reason to hope for a considerable improvement in the iron trade in the present year.

Coral Fishery on the Coast of the Island of Sardinia.—Coral is obtained in large quantities in the Mediterranean. The French have from time immemorial carried on the fishery for this precious zoophyte off the Algerian coasts. Coral is also an important branch of industry and commerce in Italy. That which is obtained from the Sardinian coasts is chiefly found in the shallow waters near Carloforte; Alghero, a province situated on the west cost of the island; and the island of Maddalena. At Alghero, where the growth of coral is the most plentiful, it may be estimated that 190 vessels, of which 150 are Neapolitan, 20 Tuscan, and 20 Sardinian—manned by 1,930 sailors—are employed in this fishery, which begins in the month of March and ends during the month of October. The rose coral, which is the most prized, is sold at very high prices, as it is entirely a fancy article. £80 was paid a short time ago for a piece of uncommon beauty weighing nine ounces. The ordinary price is about £24 per kilogramme. The price of red coral is about £6 per kilogramme. The white coral, the quality of which is often deteriorated by being worm-eaten, is sold at about £2 8s. per kilogramme, and the *ferraglio* at 5s. per kilogramme. The greater part of the coral is brought to Torre del Greco, near Naples. The Sardinians and Tuscans send the produce of their fishery principally to Genoa and Leghorn. The value of the coral obtained each year amounts to £60,000. From this must be deducted £45,800 to defray the expenses of the fishery, so that there remains a net profit of £13,000.

Manufacture of Wines called "Vins de Paille" in France.—The manufacture of these wines is almost unknown beyond those districts in Alsace where it is carried on. All grapes are not suitable for the manufacture of "vins de paille," and it is necessary that the vines should be grown in soils that are suitable for the cultivation of wheat, and for this reason the manufacture of this wine is carried on only in certain districts. At the time of the vintage, the grapes are gathered and loaded with care, and carried to the press-room, where they are spread upon straw, but frequently they are hung upon sticks or cords, with which every corner of the building is furnished, and these grapes may even be found hanging in lofts and passages of the building. This last place is more advantageous, as the grapes are more easily examined than when spread upon straw; with a little care they may be kept until the proper time for being picked, almost entirely free from rotten ones. The manufacture takes place towards the end of the month of February, and the bunches of grapes are again examined before picking; those that are simply rotten are kept, whilst the mouldy ones are thrown away. They are then trodden in small quantities in small tubs, as the grape being in a state of semi-desiccation it cannot be completely crushed, the centre of the mass resisting like an elastic body. The pressed grapes are then heaped up in a cask, and four and twenty hours afterwards the fermentation will have sufficiently softened the mass to permit its being passed through the press. For the manufacture of this wine it will be seen that almost a princely fortune is necessary. A cask of "vins be paille" requires for its production a quantity of grapes which, previous to their desiccation, would have produced ten casks. This wine, destined for royal tables or for the episcopal tables of Germany, does not attain its maximum quality until it has been kept at least a dozen years, and after fifteen years its quality is still better. It is curious that, after all this time, it is neither oiled, racked off, nor fined. Racking would be difficult, and the loss excessive, if it was applied to a syrupy liquid like molten gold. As to the oiling it is not necessary, as this wine contains so much sugar that the air has no effect upon it. The skins of the grapes are sometimes distilled. It will be understood that, as these wines contain so large a proportion of sugar, they are of great use for improving the quality of weak white wines. Such wines are poured upon the skins of grapes that have served for the preparation of the "vins de paille" and carefully mixed. As soon as the fermentation begins these are taken away, and the fermentation is completed in casks.

Commerce.

Shipping in Russian Ports.—In the port of Riga, from the 1st June to 1st September, 1,011 vessels arrived and 969 sailed. In the sea of Azof, from the opening of the navigation to the 3rd September, 2,881 vessels passed through the Straits of Kertch; the previous year, in the same space of time, the number of vessels that arrived and sailed was about 5,000. There was last year a great movement of shipping in the port of Cronstadt. During the season that it has been open to navigation 2,702 vessels entered, of which 437 were steam vessels and 2,265 sailing vessels. These vessels are divided in the following manner, according to their nationality:—1,164 English, 365 Dutch, 217 Danish, 136 Prussian, 132 Hanoverian, 119 Swedish, 111 Norwegian, 99 Russian, 90 French, 79 Schleswig-Holsteiners, 77 from Lubeck, 59 from Oldenburg, 24 from Mecklenburg, 24 Italians, 12 Americans, 6 Belgians, 4 Austrians, and 3 from Hamburg.

American Gold.—Since the 1st of January, 1866, the receipts of gold at New York from California have amounted to about seven millions sterling. This sum is considerably under the exports in the same period, about £11,000,000. This is the largest amount shipped since 1859, when over 12 millions sterling were forwarded, chiefly to England. On a comparison of years it appears that the annual loss of bullion to the States, that is the difference between the direct imports and exports, is about ten millions sterling. So large an outflow would seem to indicate impoverishment, but it must be recollected that the annual value of the gold and silver raised in America is about 21 millions sterling, the whole of which is immediately passed into active use. So long as the mines of California, &c., continue to yield largely, so long will capital continue abundant in the United States.

Coal Exports.—Messrs. Higginson's circular gives a statement of the export coal trade of the port of Liverpool during the past eleven years, showing the increase of the coal trade at Birkenhead by rail, during the same period, and the quantity exported from there, separate from that shipped on the Liverpool side of the river. There were exceptional causes at work during the year 1865, to cause the exports from the Mersey to fall off as compared with 1864, a large quantity of tonnage usually loading at this port being locked up in eastern ports for want of cargoes to bring them home. This has therefore taken much of the business that would have been done at Birkenhead to the east coast and Severn ports. There was also a great falling off in the quantity of South Wales coal exported from Birkenhead in 1865 as compared with 1864; the decrease being somewhere about 30,000 tons, the requirements for blockade running steamers at Nassau, Bermuda, and elsewhere, having ceased early in 1865.

Year.	Tons of Coal brought to Birkenhead by Rail.	Tons of Coal Exported from Birkenhead.	Tons of Coal Exported from Mersey, exclusive of Birkenhead.	Total Foreign Exports from the Port. Tons.
1855..	178,368	.. .. ..	.. .. ..	406,561
1856..	211,815	.. .. ..	.. .. ..	415,036
1857..	276,352	.. .. ..	.. .. ..	499,173
1858..	253,061	.. .. ..	.. .. ..	467,478
1859..	309,683	.. .. ..	.. .. ..	564,947
1860..	236,667	144,000	450,040	594,040
1861..	291,015	190,000	434,549	624,549
1862..	356,802	230,000	379,748	609,748
1863..	428,478	248,956	337,777	586,733
1864..	525,665	313,398	433,444	746,842
1865..	486,505	227,348	389,628	616,976

It appears that Liverpool ranks as fourth in quantity of the coal-exporting ports of the United Kingdom. The total quantities sent abroad during the past year from the four largest exporting ports respectively are as follows:—

1865.

Newcastle	2,277,532 tons.
Cardiff	1,450,941
Sunderland	1,123,572
Liverpool	616,976

Colonies.

South Australian Finance.—The finances of the Government are satisfactory, but a considerable falling off in customs and land sales is expected in the year now commencing. Regarding the large balance in the hands of the banks, it is proposed to let them remain for the present, as it is thought some inconvenience might arise from their withdrawal, and they are not wanted for present use. Government propose to borrow £100,000 for the improvement of Port Adelaide, £150,000 for the construction of a new water works reservoir, and £20,000 for a loop line from Dry Creek to Port Adelaide. In addition to these, government has undertaken an extension of the railway system northwards by laying down light rails for horse traction. An Act of Parliament has recently been passed authorising the leasing of crown lands for other than pastoral purposes. Much is expected from this act, which is very liberal. It enables one to take blocks of land in any size less than 2,500 acres, at 2s. 6d. per annum rent. No conditions are imposed upon the lessee, who will be entitled to the fee simple of his leasehold after he has made eight annual payments of rent.

The Labour Market in Queensland.—The Government are doing everything in their power to provide means to assist the unemployed in and around Brisbane and Ipswich, by the establishment of relief camps, and by offering free passages to those parts of the colony where labour is easily obtainable; but notwithstanding that many have availed themselves of this, and have been conveyed to the northern parts of the colony, the distress in Brisbane still continued. The government have been compelled to alter the rate of wages to men employed in the relief camp from 15s. per three days to 15s. per six days' work, in consequence of which many of the men have struck, and have held a meeting in the outskirts of the town, when it was decided that a petition should be presented to Parliament, praying that they would either grant the unemployed 5s. a day or a passage to Texas, or some colony where labour was more abundant and better wages obtainable. The petition was presented to the Assembly and caused a long discussion. Those who spoke on the occasion were unanimous in recommending government to offer a rate of wages which would keep the destitute from starving, but not interfere with employers of labour, and to convey the unemployed to those parts of the colony where labour was wanted. In the north of the colony as much as 40s. per week has been paid to inexperienced men during the lambing season, and even at this rate sufficient men were not to be obtained.

North Australia.—The prospects of a settlement on the north coast of Australia are more gloomy than ever. Mr. McKinlay and his companions, however, speak very highly of the country in Anson's Bay. There is splendid black soil everywhere, commencing close to the sea coast; there is also a fine vegetation, and kangaroos and birds in abundance. The bay is open, but a large island at the north affords a good shelter, and the mouth of the river is large enough to serve as a harbour, but there is a sand-bank across it which should be cleared by artificial means.

Railways in Victoria.—The revenue of the railways in Victoria for the half-year ending 30th June last, was £276,646 2s. 3d., and the expenditure £126,135 10s. 6d., leaving an excess of revenue over expenditure of £150,510 11s. 9d. The passenger traffic yielded £109,482, and the goods traffic £148,214. The average cost of each train per mile was 4s. 4d. $\frac{53}{100}$ or 45·60 of the accruing revenue. This expenditure is made up as follows:—

	s.	d.
Maintenance to permanent way and works	0	9·55
Locomotive charges	1	8·58
Passengers and goods traffic charges	1	7·67
General charges	0	2·72

On the Williamstown Railway the expenditure was within 7 per cent. of the revenue, the cost per train per mile being 5s. 2·98d. against 4s. 2·05d. on the Murray River line, and 4s. 5·92d. on the Ballarat line.

Notes.

New National Gallery.—Foreign ministers, members of the two Houses of Parliament, royal academicians, and the competing architects, will, on presentation of their cards at the entrance door, by the Victoria Tower, in the New Palace at Westminster, be admitted on Monday and Tuesday, the 7th and 8th instant, between 10 and 4, to view the designs for the new National Gallery, in the Royal Gallery; and the public will be admitted on Wednesday, the 9th instant, and the three following days, and also on the four last days of each of the two succeeding weeks.

Public Instruction at Moscow.—The following are some statistics on the establishments of public instruction in Moscow in the year 1865. This city, containing 365,000 inhabitants, possesses 167 schools, of which 69 are for boys and 58 for girls, and 40 for children of both

sexes. The number of pupils is 11,366 boys and 4,950 girls, and the schools are conducted by 1,521 professors and 70 female teachers. For university education there is only one establishment, the University. The Academy of Agriculture, and the Conservatoire, which have recently been founded, are not included. General instruction is given in five establishments, containing in all 1,719 pupils; three military colleges, containing 1,426 pupils, and six schools for girls. Besides these there are about a hundred private schools, where elementary and general instruction is given. The 66 elementary schools only contain 4,786 pupils, a very small number as compared with the number of the poorer classes which represent 72 per cent. of the total population. The 106 schools supported by the government, by the town, or by benevolent societies, occasion an annual expenditure of 2,560,000 roubles; of this amount 426,000 roubles is required for the University, and 130,000 roubles for the professional school.

Paris Parks.—The works of the new park of the Buttes Chaumont are proceeding rapidly, and the inhabitants of the northern part of the city will soon possess one of the most beautiful pleasure grounds in Europe; and another public place of recreation is about to be commenced on the opposite side of the city. The spot selected for the new park is called Montsouris, and is situated on the left of the little river Bièvre, on the southern extremity of Paris, and commanding an extensive view of the Pantheon, Observatory, and other public buildings on the other side of the Seine, and also of the high lands which bound Paris towards the north-east. The ground is traversed by the conduits which convey the waters of Arcueil to the metropolis, which will facilitate the supply of the artificial lakes and canals of the new park. The site occupies about 40 acres, and the new park will complete the public pleasure grounds of Paris, which will then possess four, the Bois de Boulogne to the west, the Bois de Vincennes to the east, the Parc of the Buttes Chaumont to the north, and that of Montsouris to the south. The piece of ground selected for the new promenade is within the walls of Paris, but at present completely cut off from the city, the only road to it being the military route just within the fortifications; the transformation of this desert spot will therefore include a considerable amount of road work. A new boulevard is to be constructed on one side of the park, and two avenues, each more than 70 ft. wide, planted with trees, will connect the new park with the nearest part of the city. One of these avenues will be more than 800 ft., and the other about 3,000 ft. long. The spot is admirably adapted for the purpose intended, for a waste will thus be converted into an elegant pleasure ground, and the two districts adjoining, heretofore almost cut off from direct communication with each other, will thus be united. The railway now making for the completion of the circular line around Paris passes closely the site of the new park of Montsouris.

Scholastic Registration Association.—The first annual general meeting of this Association, open to all schoolmasters and teachers, will be held on Tuesday, 8th January, at three p.m., at the house of the Society of Arts, by permission of the Council. The Honorary Secretary will read a report of the progress of the movement to this date, and will fully explain the constitution and operations of the Association. Several gentlemen of influence will take part in the meeting.

MEETINGS FOR THE ENSUING WEEK.

Mon..... Entomological, 7.
Asiatic, 3.
Victoria Inst., 8.

Tues ...Medical and Chirurgical, 8½.
Civil Engineers, 8. Discussion upon Mr. Preece's paper, "On Intercommunication in Trains in Motion."
Royal Inst., 3. Professor Frankland, "On the Chemistry of Gases." (Juvenile lectures.)
Photographic, 8.
Ethnological, 8. 1. Lieut.-Col. G. T. Dalton and Dr. Mouatt. "On the Wild Tribes of Central India." 2. Mr. J. Crawfurd, "On the History and Migration of Cultivated Plants in reference to Ethnology—Sacchariferous Plants."

Wed ...Geological, 8. 1. Mr. W. Boyd Dawkins, "On the Age of the Lower Brick-earths of the Thames Valley." 2. Mr. George Maw, "On the occurrence of Consolidated Blocks in the Drift of Suffolk." 3. Mr. Ralph Tate, "On the Jurassic Fauna and Flora of South Africa."
Graphic, 8.
Microscopical, 8.
Literary Fund, 3.
R. Society of Literature, 4½.
Archæological Assoc., 8½.

Thur ...Royal, 8½.
Antiquaries, 8½.
Zoological, 8½.
Syro-Egyptian, 7½.
R. Society Club, 6.

Fri .....Astronomical, 8.

Patents.

From Commissioners of Patents' Journal, December 28th.

Grants of Provisional Protection.

Alkalies—3214—J. Williamson.
Boots, &c., rendering durable—3137—J. Wadsworth.
Bottles, securing and labelling—3230—J. McGlashan.
Chains and chain cables—3041—T. M. Gladstone.
Detaching hooks—3228—W. Clark.
Elastic fabrics—3151—L. Turner.
Fibrous substances, preparing—3157—W. Crighton.
Fibrous substances, preparing—3218—R. Ackroyd and W. Maud.
Flutes—3208—R Carte.
Gas—3226—A. C. Fraser.
Locomotive carriages—2551—J. W. Daniell.
Metal bands, connecting the ends of—3234—H. C. Lucy.
Metals, treating ores of—3212—P. E. de Wissocq and L. Krasinski.
Motive power—3224—W. Clark.
Paper, printing and cutting into sheets rolls of—3222—J. C. MacDonald and J. Calverley.
Pianos, &c., automatical performance of music on—3169—M. A. F. Mennons.
Pumps and fire-engines—3149—H. Bateman.
Railways, chair supports for the rails of—3153—A. Davy.
Rope, carding, &c.—3159—W. E. Newton.
Saws, &c., reciprocating—3236—W. Robertson and C. J. Waddell.
Ships, applying auxiliary power to sailing—3210—R. Duncan.
Spinning and doubling—3155—P. McGregor.
Steam engines—3143—J. Field.
Vessels, propelling—3139—E. Hughes.
Weaving, looms for—3167—J. Nuttall.
Yarns—3216—P. and R. Sanderson.

Inventions with Complete Specifications Filed.

Digging machines—3361—W. R. Lake.
Furnaces—3371—W. Clark.

Patents Sealed.

1662. T. Godfrey.
1749. H. A. Bonneville.
1751. H. A. Bonneville.
1761. W. Staufen.
1763. G. R. Sheraton.
1766. H. Wootton.
1767. W. Adolph.
1780. W. E. Gedge.
1796. A. Clark.
1803. W. Baines.
1819. W. Hobbs.
1900. M. Bayliss.
1922. W. E. Newton.
2036. W. E. Newton.
2056. A. V. Newton.
2059. C. F. Cotterill.
2102. G. Hunter & W. F. Cooke.
2194. W. Clark.
2468. W. E. Newton.
2566. J. C. Chapman.
2590. W. E. Newton.
2679. J. Bronner.
2714. O.L.Hopson&H.P.Brooks.
2763. J. Storer.

From Commissioners of Patents' Journal, January 1st.

Patents Sealed.

1770. D. Nichols and W. B. Leachman.
1774. J. Clegg and J. Smith.
1775. T. Sagar and T. Richmond.

Patents on which the Stamp Duty of £50 has been Paid.

3306. J. Clegg.
3278. W. Wilson.
3283. T. Bourne.
3307. J. Dale and H. Caro.
19. J. Bullough.

Patents on which the Stamp Duty of £100 has been Paid.

2958. A. McDougall.
2969. J. S. Crosland.

Registered Designs.

Fountain Pen—December 6—4828—M. Turner, Birmingham.
Fire-place, Lintel, and Flue-piece—December 8—4829—J. Gibbs, 6, Doran's-lane, Lord-street, Liverpool.
Paragon Show-case and Counter-guard—December 21—4830—W. Wooding, jun., and J. Johnson, jun., 2, Mare-street, Hackney.
Improved Clamp Skate—December 26—4831—F. Harris, Sheffield.

Journal of the Society of Arts.

FRIDAY, JANUARY 11, 1867.

Announcements by the Council.

Notice to Members.

The Council have decided to set apart the first Wednesday in each month, during the present Session, for the discussion of various questions connected with Arts, Manufactures, and Commerce; these discussions may commence either with or without the reading of a paper.

Any member desiring to introduce a subject for discussion should give notice of it to the Secretary, and, if approved by the Council, it will be announced in the *Journal* for one of these evenings. The member who opens the discussion must not occupy more than half-an-hour, but will have the right of reply. No division is to be taken.

On the evening of Wednesday, the 6th February, Mr. Henry Cole, C.B., will introduce the following subject:—

"On the existing legal regulations in reference to the Cab Fares in the Metropolis, and their effect in rendering the Vehicles inferior to those provided in other European Capitals and the large Municipal Towns of this Country."

A new list of members of the Society has been printed, and any member can have a copy sent to him on application to the Secretary.

The Council have appointed Mr. Astrup Cariss, of Liverpool, Honorary Local Secretary to the Society of Arts in that district, in the room of the Rev. Dr. Hume, resigned.

Ordinary Meetings.

Wednesday Evenings at Eight o'clock:—

January 16.—"On Mercantile Marine Legislation, as affecting the Number and Efficiency of British Seamen." By Captain Toynbee, F.R.A.S.

January 23.—"On the Iron Permanent Way used on German Railways." By T. A. Rochussen, Esq.

January 30.—"On Artificial Illumination." By D. N. Defries, Esq.

Cantor Lectures.

The following is the syllabus of the course of Six Lectures "On Pottery and Porcelain," illustrated by specimens of various manufactures, and by photographs and diagrams, to be delivered by William Chaffers, Esq.:—

Lecture I.—Monday, January 21.

Ancient Pottery.—Introduction. Assyria and Chaldea, Egypt, Greece, Etruria, Rome, &c.

Lecture II.—Monday, January 28.

Maiolica.—Italy, Spain, Persia, &c.

Lecture III.—Monday, February 4.

Fayence.—France, Spain, Portugal, Russia, Sweden, Denmark, &c.

Grès or Stone Ware of Germany and Flanders.

Delft Ware, &c.

Lecture IV.—Monday, February 11.

Oriental Porcelain.—China, Japan.

Lecture V.—Monday, February 18.

European Porcelain.—Italy, Germany, France, Holland, Belgium, Russia, Poland, &c.

Lecture VI.—Monday, February 25.

English Pottery and Porcelain.—Early History, continued to the beginning of the 19th century.

The lectures will commence each evening at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend to each lecture.

Subscriptions.

The Christmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Food Committee.

The sub-committee met on Friday, the 4th inst., and again on Wednesday, the 9th inst.

The following correspondence has taken place on the subject of Mr. Chester's observations on the various kinds of *Extractum carnis* in his opening address, published last week:—

Plough-court, Lombard-street, E.C., Jan. 4, 1867.

Sir,—In your important address to the Committee of the Society of Arts for inquiring and reporting respecting the food of the people, we notice an allusion to Liebig's extract of meat, which, we fear, is liable to lead to an erroneous inference respecting the position of manufacturers of the article, and the relative merit of their products. You are reported to have said that you "believed there was not much doubt as to which of the three (advertised) was the genuine article." It is the fact that a joint stock company was formed about a year ago to manufacture the extract in South America, and that they are now strenuously endeavouring to create a monopoly in the trade; and we regret to add that in this they are supported by Baron Liebig, who has become pecuniarily interested in the undertaking. But it is also the fact that Baron Liebig published the process for making the extract, upon his discovery of it, in the "Annalen der Chemie und Pharmacie" for 1847. Also in "Liebig and Kopp's Report for 1847-8;" in his "Chemistry of Food," 1847; in his "Familiar Letters on Chemistry," and probably elsewhere. It was also published, many years since, in the Bavarian Pharmacopœia; in Cooley's "Encyclopedia of Receipts;" in Beasley's "Pocket Formulary," &c. Hence there really appears to be no ground for the product of one manufacturer being called genuine in preference to that of another, though doubtless quality will vary, according to the skill and good faith with which the process is carried

out. As the commercial representatives of a gentleman who, by great energy and the expenditure of a large amount of money, has been the first to manufacture Liebig's extract of meat as an article of commerce in Australia, we feel it due to him and to all others interested in this important article to trouble you with these explanations. Trusting that this may be a sufficient apology,—We remain, &c., Allen and Hanburys.

To Harry Chester, Esq., Rutland-gate.

63, Rutland-gate, S.W., 5th January, 1867.

Gentlemen,—I have the honour to acknowledge the receipt of your letter of the 4th inst. It is possible that the expressions which I used may lead to an erroneous inference respecting the position of manufacturers of the *Extractum carnis*, but scarcely, I think, respecting the relative merit of their products. I intended to imply that, while only one of the three was an article guaranteed by Professor Liebig himself, the Committee, in the interest of the public, would do well to subject all three to the same analysis, and to give publicity to the result, in order that it might be known which was really the best. Nothing could be further from my wishes, in connection with the important subject of the food of the people, than to promote a monopoly of any kind.—I have, &c., Harry Chester.

To Messrs. Allen and Hanburys, Plough-court.

The Monte Videan Consul-General has made an application for a few numbers of the Society's *Journal* to be placed at his disposal for transmission to South America each mail during the discussion on the food question, "in which," he says, "the Republic of Uruguay is so greatly interested." He adds that "it is intended to offer a liberal prize, during the Paris Exhibition, for a process the best adapted for the utilisation of La Plata beef for European markets." This request has received a favourable reply.

THE BRITISH COLONIES AT THE PARIS EXHIBITION.

By P. L. Simmonds.

It is satisfactory to know that the Colonial Possessions of the British Empire are likely to be well represented at the approaching great International Exhibition in Paris. The French are determined to make the most of the products and manufactures of their colonies, and the plan of the arrangements to be carried out at Paris under the two chiefs in this special department is excellent. M. Aubry-Lecomte, the intelligent curator of the Colonial Department, made an excellent display even in his limited space in the French Court in London, in 1862. Where the valuable collection of colonial products, so admirably labelled and described, which were handed over to South Kensington by the French Government, now is I cannot say. I believe, however, it has been sent to the branch Museum at Edinburgh. Seldom has such an opportunity of supplementing the food and trade collections of South Kensington been afforded as that furnished by this vast collection. As a well-informed traveller, personally acquainted with the colonies—a good botanist, and a man eminent for his scientific writings—the acquisition of a large collection which had passed through M. Aubry-Lecomte's hands was an event of importance. The valuable jury and other official reports on the Exhibition of 1862 which he prepared for his Government, and the distinctions he has received, are proofs of his extended knowledge and ability. The Algerian collection of M. Teston, though to some extent more restricted in its character, was also most characteristic and interesting. The two special French permanent colonial collections of Algeria and the Colonies having been temporarily removed from the Palais de l'Industrie, in order that that building may be utilised for the great *fêtes* of the forthcoming Exhibition, the curators have the more leisure to develop the indigenous products and manufactures of the colonies with which they are charged. While, therefore, the French on their own more extended ground are desirous of making a magnificent display of the resources of their few colonies, it is pleasing to find that full opportunity is at the same time given to the British colonies to stand prominently forth before the European world and visitors at large.

It is generally admitted that one of the finest displays ever made by our Colonies was that in 1862; and as an equal amount of space is afforded them collectively at Paris, there is every reason to believe that they all intend to do their best.

According to the official allotments, the following are the proportions of space assigned for each group:—

North American Colonies.

	Feet.
Canada	2,000
Nova Scotia	600
New Brunswick	600
Prince Edward Island	250
Newfoundland	200
Bermuda	100
Vancouver Island	200
British Columbia	100
	4,050

West Indian.

	Feet.
Jamaica	450
British Guiana	350
Trinidad	150
British Honduras	100
Bahamas	150
Dominica	50
St. Vincent	50
Barbados	10
	1,310

Australian.

	Feet.
Victoria	1,500
New South Wales	1,000
South Australia	650
Tasmania	650
Queensland	450
New Zealand	300
	4,550

East Indian, etc.

	Feet.
Ceylon	300
Mauritius	150
Malta	150

African.

Natal	200
Cape Colony	100
St. Helena	50
	950

We are likely to have twice as many colonies represented at Paris in 1867 as in 1855. From the foregoing figures, it will be seen that Canada and Victoria will fill the largest spaces. Having had much previous experience in colonial arrangements, and being also in the receipt of official advices from most of the governors, I am enabled to make some few remarks as to the probable displays of each group of colonies; and certainly in the aggregate they will have lost none of their importance and attractiveness since 1862.

Firstly, then, as to the North American group. Canada has always made a fine display at the International Exhibitions, and with a large portion of her

population of French extraction, there is naturally a desire to place her products and manufactures prominently forward in France. In 1855 Canada received one grand medal of honour, one medal of honour, 13 first-class and 30 second-class medals, besides 43 honourable mentions. The display of the products of mines, forests, and agriculture on that occasion was truly magnificent. Upwards of £16,000 was spent on it. In London in 1862, although a very fine display was made, the commission were stinted for funds.

Nova Scotia, which has taken a prominent and creditable part in the two last International Exhibitions, will put in a good appearance at Paris, under the able superintendence of Dr. Honeyman, F.G.S., who has done so much for her geology and credit in former Exhibitions. Of New Brunswick and Prince Edward Island we hear little at present, although they both sent good collections to London in 1862. Newfoundland will doubtless do something, now that the colony is brought so prominently into notice by the Atlantic Cable. It has little, however, to show except the products of its abundant fisheries, some few minerals, and furs. Bermuda may make a small and neat display. The great distance of our north western possessions on the Pacific, is likely to prevent exhibits from Vancouver and British Columbia reaching Paris in time. Of the West Indian group, British Guiana, Trinidad, and the Bahamas, are the only colonies from which collections may be expected. The recent political excitement in Jamaica has quite interrupted attention to science. Honduras and the smaller West Indian islands may send a few things, as in 1862.

With the exception of Western Australia, the whole of the Australasian colonies will be well represented. Their financial condition and industrial resources enable them to stand forth prominently on this occasion. The only fear is that Victoria will, as in 1862, be behindhand at the opening day, and whilst not being ready herself, will also have been the means of keeping back many of the other colonies whose goods should be near at hand, to be ready for installation in February or March. With the disposition to centralize and attract notice to herself, Victoria has just been holding an Intercolonial Exhibition, to which most of the adjoining colonies were induced to send their exhibits in the first instance before transmitting them to Paris. This local exhibition was only opened in Melbourne on the 24th October, and it is not likely that the goods can be repacked and shipped from Port Phillip before the end of December, so that unless quick passages are made, the vessels cannot arrive in London before the end of March, affording no time whatever for unpacking and arranging goods for the opening on the 1st April. Some of the products intended to be shown by Victoria were noticed recently in the *Journal*.

South Australia proposes to send to Paris a fine collection of its splendid wheat and flour, soap, raisins, pickles, and preserves; kangaroo, calf, and other tanned skins, a large quantity of wine, in bottles and casks; about 100 fleeces of wool, a fine collection of minerals in blocks, cases and cabinet specimens, a slab of marble, 5 feet by 3, a case with 80 facsimiles of Australian fruits, a fine collection of natural history specimens, comprising 200 birds, 12 animals, several fish, reptiles, &c., a collection of woods, photographs, bundles of native spears, implements, waddys, &c., and 18 or 20 live animals and birds. The commissioners appointed are the Hon. G. M. Waterhouse, the Hon. H. Ayers, and Mr. Anthony Foster.

Those who remember the fine and varied collections shown by Tasmania, New South Wales, and Queensland in 1862, will feel assured that in wool, woods, fibres, and minerals they will be equally well represented; also in manufactures and industries, which have lately risen to some importance.

The Colonial Secretary of New Zealand advises me officially that by an arrangement made some time since, the several Superintendents of the nine provinces of the colony were appointed Commissioners, for the purpose of securing the proper representation of the products, &c., of each particular province at the Paris Exhibition. Bearing in mind the excellent display of products made last year at the Otago Exhibition, Dunedin, a very creditable and interesting general collection may be expected from New Zealand.

Of the East Indian and African groups of colonies I have no special advices. Dr. Forbes Watson, I know, is actively engaged in making a noble display of the various products and industries of India; and not the least interesting feature will be the great work which he has recently brought out, on the "Textile Manufactures and Costumes of the People of India." It is to be hoped that the approaching transfer of the India Museum to South Kensington will not lead to the entire withdrawal from public view of the raw materials and trade products, which are there considered subordinate to the more attractive mediæval and fine art objects.

Mauritius always holds its ground in its special products, under the able management of its Commissioner, Mr. J. Morris; and its native manufactures are sure to be well represented in Paris.

Natal will send a fine collection, as she did to London and Dublin; but the Cape Colony has little to exhibit beyond its wool and wines.

POPULAR EDUCATION IN GERMANY AND SWITZERLAND.

In a letter to the *Manchester Examiner and Times*, Mr. Joseph Kay, who is so well known as an authority on the above subject, says:—

You permitted me to tell your readers how the towns of Prussia, Hanover, Saxony, Baden, Wurtemburg, Bavaria, and the cantons of Switzerland provide themselves with school buildings, playgrounds, teachers, books and apparatus, and how they raise the funds wherewith to pay the school fees for the children of poor parents, and wherewith to supply them with decent clothing for school attendance.

Will you allow me to explain, as simply as I can, the great efforts which these countries are making to obtain good, learned, and efficient teachers for the management of the schools in which the children of nearly all classes of the people commence their education. Of course, in this, as in other parts of their educational systems, the regulations of these different countries vary in some particulars, and in a letter like this I can only attempt to give a general survey of them.

When these countries first began, after 1819, to put in actual effective operation systems of compulsory education, it was felt that it would be worse than useless to provide school buildings and playgrounds, or to send the children there, unless by some means or other good and efficient teachers were obtained for the superintendence, management, and instruction of the children. Several eminent men, and among others, Pestalozzi, Dr. Fallenberg, Vehrli, and Dr. Diesterweg, insisted that a teacher's duties required for their right performance a special training; that an inefficient, ignorant, and immoral man, in such a situation, was a positive evil; that if the teachers really understood the duties of their profession and earnestly performed them, the social condition of the poor would be soon vastly improved; and that it was the duty of the nation, for the sake of its own highest interests, to find all the funds which were necessary for the training of the teachers, for their proper maintenance when appointed, and for their due support when disabled. They argued that by these means fit men would be induced to seek to enter into the profession, and to devote themselves to its important but arduous duties. Several of the eminent men to whom I have alluded established institutions themselves, where for many years they devoted themselves to the education of teachers, in order to show their countrymen what the

teachers of their children ought to be. Of these original institutions I visited two—one conducted on the lake of Constance, by Vehrli; and the other conducted near Berne, by the son of its founder, the celebrated Dr. Fellenbergh.

The example and teaching of these men gradually produced its effect. Training colleges for the teachers were established, first in the Swiss Cantons, then in Prussia, and, at last, over all the countries I have named. And now, for the last forty years in some of these countries, and for the last thirty in others, great sums have been annually expended by the governments in founding, perfecting, and supporting great numbers of these colleges for the education and training of the teachers of the different religious parties. Some of these colleges are set apart for the education of Roman Catholic teachers, and others for the education of the teachers of the Protestant churches.

As soon as means were provided for the education of teachers laws were enacted which prohibited any person from officiating as a teacher, either in a private or a public school, until he had passed an examination and obtained a diploma or certificate of fitness from one of the examining bodies instituted by law. All the teachers in these countries are now educated men who have obtained their diplomas.

Schools like our so-called "dame schools," and schools conducted by poorly-educated mechanics, shoemakers, or tailors, are unknown in these countries. They would not be tolerated. In some of the countries I have mentioned it is thought so important that none but really efficient men should be entrusted with the management of schools that the law forbids the examiners to grant a diploma or certificate to any one who is deaf, blind, lame, deformed, or consumptive. And, in addition to these precautions, the examiners are forbidden to grant a diploma to any candidate who does not present at the examination a certificate of good moral character, signed by the religious minister of the congregation to which the candidate belongs.

Such being the stringent precautions which are taken to shut out unfit persons from the profession, let us see what has been done to induce clever boys and young men to strive to enter it. The inducements are the following:—

1. Nearly all the expenses of the teacher's education are paid by the central or provincial governments.
2. If the young candidates once succeed in getting a diploma, their future career is assured.
3. A house, a moderate and increasing stipend, fuel, and, in the country districts, a small plot of land, of one or two acres in extent, are provided for the teacher.
4. A provision is made for those who become incapacitated by age or sickness.
5. A provision is also made for the widows of deceased teachers.
6. They are exempted from liability to perform military service.

But what is beyond all these advantages, in the estimation of many, is the fact that the profession opens an honourable career to the intelligent and clever children of the poorest parents. It is an outlet for the intellectual activity of the ablest of the poorest classes. It is a ladder by which a clever boy may climb out of the ranks of mere manual labour.

This last consideration, and the universal sense of the good that these excellent men are doing, side by side with the religious minister, make them thoroughly popular and thoroughly trusted among all classes of the people. The teachers are always mentioned with respect and admiration. Owing to these considerations, there are always in all these countries great numbers of candidates for the teacher's profession. These candidates are the sons of mechanics, small shop-keepers, workmen, farmers, and of the teachers themselves.

Let me shortly sketch the training and education through which those who wish to enter the teacher's profession have to pass.

All children, if not educated at home, are obliged to attend some school until their 15th year. If, at that time, a boy's parents wish him to enter the teacher's profession, and if he shows sufficient ability and industry to give fair promise of success, he remains at the primary school for two or three years longer, and pays the teacher some small extra fee for special instruction; or, if his parents or friends can afford the small extra expense, he enters the classes of one of the superior or secondary schools. Until he attains the age of 18, he pursues his studies in one of these schools. At the age of 18 he takes with him certificates of conduct, and presents himself at one of the annual entrance examinations of one of the teachers' colleges. All the candidates are then examined. The most proficient are selected to supply the annual vacancies. Once admitted into one of these institutions, the expense of his education and board is defrayed for two or three years almost entirely, and in some cases entirely, by the government.

There are several hundreds of these colleges established throughout the provinces of these countries. Many of them are large, roomy, and admirably arranged buildings, surrounded sometimes by a farm and sometimes by large gardens. The education given in these institutions is of the most liberal, but at the same time of the most practical kind. The education comprises:—

1. Religious instruction under the direction of the head of the college.
2. The German language.
3. Geography, history, the rudiments of the physical sciences, botany, and natural history.
4. Farming or gardening.
5. Drawing.
6. Music.
7. Pedagogy, or the art of teaching.

In some of these colleges Latin is also taught. In all of them the young teachers practise singing and also the use of some musical instrument. Nearly all the teachers in Prussia can play either on the organ, pianoforte, or violin. In one of the Prussian colleges I saw four organs, nine pianofortes, and 100 violins, for the use of the students. Singing forms a part of the instruction given in all schools, both in the towns and in the country districts.

In many of these colleges, the young men are taught how to dress the more ordinary kind of wounds, and how to act in the case of the more ordinary kind of accidents, so that they may be able to render aid in the villages, in the absence of a medical man.

In some of the purely agricultural provinces, the young teachers are taught scientific and practical farming, so as to be of use to the farmers in the remote districts in which they will have to labour. In many of the colleges, they are taught how to manage orchards and kitchen gardens, and how to prune trees.

A school for the children of the neighbourhood is generally connected with each of these institutions. In the school the young teachers practise teaching for a certain number of hours every week, under the guidance and surveillance of experienced teachers. I mention all these things only to give your readers some faint idea of the care which is bestowed in these countries to fit the teachers to be the instructors and the moral guardians of the children, the assistants and friends of the parents, useful neighbours of all, and disseminators of a higher civilisation in the remoter districts.

I visited these colleges in the provinces on the Rhine, at Berlin, in the south of Prussia, in Saxony, at Carlsruhe, in Bavaria, on the Lake of Constance, and in many of the Swiss Cantons. Everywhere the effort seemed to be to make the teachers as efficient and as useful as possible to the people among whom they would have to labour and to live.

When the period of residence in these colleges is con-

cluded, the young men are examined by boards of examiners. If they pass these examinations satisfactorily they receive their diplomas, and they can then accept a situation as teacher. But if they do not pass they cannot obtain a diploma, and the law forbids, in their case, their acting as teacher, until they have obtained the necessary certificate of competence at another examination.

Every parent has, by these means, the assurance that any one who is officiating as a teacher has obtained a diploma, certifying the sufficiency of his acquirements and the correctness of his moral conduct; while the reputation and status of the teacher is, by these means, raised in the estimation of their neighbours, and their influence for usefulness is thus proportionately increased.

Throughout nearly the whole of Germany and Switzerland, all the children, between the ages of 5 and 15, are under the care of teachers educated in this way. There are 46,227 teachers thus trained, working in the primary and superior schools of Prussia alone. I have seen them at work in their schools in various parts of Prussia, Saxony, Baden, Bavaria, and Switzerland. I have lived among them, and associated with them. They are intelligent, well-informed, and able men. They are thoroughly respected by the people.

I did not wonder, when I saw these men, to find that they were constantly entrusted with the younger children of all classes of society, and thus, even in the primary schools of artistic and luxurious Munich, children of mechanics, shop-keepers, professional men, and nobles, were sitting side by side in the same class-room, and under the same teachers. Instead of crowds of children being left to grow up in the streets, filthy, ragged, and neglected, all the children in the towns of these countries are in clean and well-furnished class-rooms, comfortably clothed, and under the care of these educated men. The health, the habits, and the education of these children are carefully watched over and fostered. Healthy sports and exercises are encouraged. Cleanliness is strictly enforced. The necessary clothes are found for those whose parents are not able to provide them.

No candied and unprejudiced man can have watched the effects of these institutions without being convinced that they are improving the physical and moral condition of the people. For my own part, I am sure that even if no instruction whatever were given in these schools, the mere sanitary advantages which are derived from them, in the improvement of the physical condition of the people, would of itself much more than repay all the expenditure which these systems of national education have entailed.

Far more, however, than this is effected by these schools. The children who are educated in this way grow up to be better citizens, more skilful artizans, more efficient soldiers, than the thousands and tens of thousands of poor creatures who are left to grow up in our streets utterly neglected.

If we English would keep our own in the great race of civilisation and of life, it behoves us to think of these things. For I am not only sure that the Prussian army owes its success partly to the intelligence and moral self-control of its soldiers, but I feel convinced that in all those pursuits and manufactures which depend for their success and for their development upon the skill, the intelligence, and the artistic feeling of the workmen, the Germans will pass us in the great race, unless we do much more than we have yet done for the education of the future generation of our workmen.

If no other proof of the admirable effects of these schools existed, there is one proof, which to my mind is incontrovertible, and that is the high value which the workmen and the peasants of these countries set upon the schools, and the respect and affection with which they always speak of the teachers. The poor themselves thoroughly understand the benefits which they and their children are deriving from the schools. The provinces where all these regulations are the most stringently enforced are the democratic cantons of Switzerland, where the people themselves enforce them.

The only discussions which are heard in the parliament are how to perfect all these regulations. No party now dreams of abolishing them. I have myself several times seen poor parents applying to the municipal authorities for permission to send their children before the legal age to school. Many and many a poor parent has told me of the benefits his children were gaining from the schools. I never heard any person in any of these countries speak in a complaining or in a disparaging way of the schools or of the teachers. And yet, spite of the experience of all these countries, it is certain that in this year, 1866, in London alone there are tens of thousands of children, between the ages of five and fifteen, who never receive any training or any education whatsoever.

MINING EDUCATION IN GERMANY.

The hundredth aniversary of the foundation of the well-known Mining College of Freiberg was to have been celebrated last summer, with great festivities. Unluckily, war broke out in Germany, and the celebration of the "Jubiläum" fell to the ground. A work, however, has been published in commemoration of this anniversary*. It contains several interesting articles, most of which are written by professors of the College. The first is a history of the Mining College from its commencement, in 1766. Short biographies are given of the professors and principal persons connected with the College since its foundation. Among these Werner is, of course, the best known, but the names of Gellert, Lampadius, Mohs, von Haidinger, Kersten, Plattner, Naumann, Breithaupt, Weisbach, Scheerer, Reich, and von Cotta, are familiar to the student of metallurgy, mineralogy, mechanics, and geology. In the account of the lectures which follows, it is shown how the plan of instruction was gradually widened until it assumed its present extensive character. The accompanying table shows the proportions the instruction has assumed in the year 1865-66 (see next page).

The students are divided into two classes—those studying at the expense of the State, and those who pay their own expenses. Saxons can have their education free on paying £7 10s. yearly. All other persons pay according to the lectures they attend.

Exhibitions to the amount of £67, besides travelling scholarships to the amount of £75, are awarded every year; they are confined to Saxons studying at the Government expense. There are besides, the Werner, Breithaupt, Bondi, and Fischer exhibitions.

The Mining College costs the State less than £2,000 a year, including the salaries of the professors, apparatus, exhibitions, &c. The library, mineral collections, models, and apparatus, have been valued at nearly £20,000. A useful adjunct to the College is the depôt of minerals for sale. Students are enabled to buy minerals at a comparatively small cost, and as exchanges are made with the regular mineral dealers, specimens from other localities are obtained for the mineral collection.

The second article is by Prof. Dr. Scheerer, Councillor of Mines, on "Mining Studies." After touching slightly upon the practical effects that the mining school has had upon mining generally, he treats at length the influence which the study of mining, as pursued at Freiberg, has upon a man's moral, social, and political character. The picture of politics, from a miner's point of view, is cleverly drawn:—"A high, dome-shaped mountain slopes down on all sides, and is surrounded by precipitous ravines. Its summit, covered with ice and nevé, allows nothing organic to grow up—that is Despotism. The nearer we get to the valley the richer and more luxuriant is the verdant covering of the hillside, until we come to the wild rugged precipice—at the edge of

* "Festschrift zum hundertjährigen Jubiläum der Königlich Sächsischen Bergakademie zu Freiberg.

Lecture.	Number of hours weekly.	Lecturer.
Mathematics, 1st part	4	Junge.
Descriptive Geometry	4	„
General Elementary Mechanics	4	Weisbach, sen.
Mathematics, 2nd part, and higher Mechanics	4	Junge.
Elementary Mining Mechanics	3	Weisbach, sen.
Construction of Mining Machinery, 1st course	2	„ „
Construction of Mining Machinery, 2nd course	4	„ „
Drawing	14	Heuchler.
Physics	4	Weisbach, jun.
Theoretical Chemistry	4	Scheerer.
Practical Chemistry	4	„
Analytical Chemistry	4	„
Mineralogy	4	Breithaupt.
„ Repetition	1	„
Mineralogical Exercises	2	Weisbach, jun.
Theoretical Crystallography	1	„ „
Geology	4	von Cotta.
„ Repetition	1	„
Palæontology	2	„
Mineral Deposits	2	„
Architecture	3	Heuchler.
Mining, 1st part	4	Gätzschmann.
„ Repetition	1	„
Mining, 2nd part	4	„
„ Repetition	1	„
General Surveying	2	Weisbach, sen.
Practical Surveying	2	Junge.
„ Repetition	Daily from morning till evening.	„
Metallurgy	4	Fritzsche.
Metallurgy of Iron	2	Scheerer.
Assaying by the dry way	1	Fritzsche.
Practical Assaying	Three times a week, five hours at a time.	„
Assaying by the wet way, and Practical Work	2	„
Blowpipe Assaying	2	Richter.
„ „ Practical Working	Twice a week two hours.	„
Mining Law and Business System	4	Gerlach.
Book-keeping	2	Gottschalk.
French Language	4	Prölss.
Private lectures on History of Architecture	2	Heuchler.
Technological Chemistry	1	Rube.

this precipice is Republicanism. Between the two extremes there is plenty of sunny and fruitful land, which will afford the Christian settler a peaceful home, without exposing him to the danger of falling over the precipice or being frozen to death. He who has chosen the soil of Constitutional Monarchy as his home has still plenty of scope, either upwards or downwards, only let him take care not to approach too closely to either destructive extreme."

Prof. B. von Cotta contributes an article on "A Collection of Rocks and Fossils in the Courtyard of the Mining College." Perhaps the most interesting and instructive part of the paper for the miner is the short account of the Altenberg Zwitter, a rock containing a sufficient quantity of tin to make it pay for working. Prof. von Cotta proves that there is a gradual passage from fine-grained reddish granite to the almost compact black stanniferous zwitter. The zwitter is an altered granite, which has lost about 3 per cent. of silica and 2 per cent. of potash, and has taken up 4 per cent. of ferrous oxide and ½ per cent. of stannic oxide.

Professor Dr. Scheerer contributes a second paper, entitled "On the Chemical Constitution of Plutonic Rocks." He adopts the division of rocks into *neptunian* (sedimentary), *metamorphic*, *plutonic*, and *volcanic*. In the two latter classes are placed all rocks made up of silicates, which were originally in the melted state, and have since then in part been erupted. Professor Scheerer finds, by comparing a number of analyses, that although these rocks consist of mechanical mixtures of several minerals, they nevertheless have definite chemical compositions, which can be expressed by chemical formulæ. He divides the plutonic and volcanic rocks into nine classes, each class having its own chemical formula. The uniformity of composition of rocks found at great distances from one another is accounted for by supposing that the rock in the melted state was a simple definite chemical compound, and that in the act of hardening its constituents arranged themselves so as to form a mixture of two or more minerals. A number of analyses of plutonic rocks are given, and these are shown to agree very closely with the formulæ which Professor Scheerer lays down.

The groups and classes which Professor Scheerer makes are as follows:—

1st Group.—Plutonic Rocks.

(*Group of the acid and neutral silicates.*)

	Examples.
1. Upper Plutonic	Red gneiss of Saxony.
2. Middle Plutonic	Much of the granite of Saxony.
3. Lower Plutonic	Grey gneiss of Freiberg.

2nd Group.—Pluto-volcanic Rocks.

(*Group of the two-thirds silicates.*)

	Examples.
4. Upper Pluto-volcanic	Quartziferous syenite.
5. Middle Pluto-volcanic	Common syenite.
6. Lower Pluto-volcanic	Melaphyre.

3rd Group.—Volcanic Rocks.

(*Group of the one-third silicates.*)

	Examples.
7. Upper Volcanic	Augite porhyry.
8. Middle Volcanic	Common basalt.
9. Lower Volcanic	Basic basalt.

The author is of opinion that "If the earth in a liquid state had solidified without any local disturbances, and had been subject to no disturbing influences afterwards, the crust of the earth underneath the sedimentary deposits would consist of these nine chemically typical rocks, all of which would probably have their constituents arranged in a more or less parallel manner."

It is found that a simple determination of the percentage of silica in a plutonic rock is sufficient to settle whether it belongs to the upper, middle, or lower class.

An article "On the Instruction in Practical Surveying at the Mining College," by Professor Dr. August Junge, shows that great pains are taken to make this branch of study complete. Each pupil is expected, during the year that he attends Professor Junge's course, to carry out the following exercises:—

The survey of a mine with the ordinary apparatus.

The survey of a mine with the surveyor's goniometer.

The levelling of a mine, &c.

To connect a mine survey to a surface survey through an adit or inclined shaft, or by the plumb line in a vertical shaft.

A triangulation, including the measurement of the base line.

A survey with the plane table, based upon the previous triangulation, in connection with the compass and theodolite.

To set out a railway or water-courses.

To measure the cubical contents generally of the *attle*-heap of a mine.

To determine the meridian line astronomically, in connection with the determination of time.

Few persons who have studied at Freiberg would pass over the article by Professor Theodor Richter, "On the Blowpipe, and its Application in Chemical and Mineralogical Investigations, and in Assaying," for scarcely a student leaves the town without carrying away with him a real affection, if I may use the term, for the blowpipe, and a grateful recollection of the kind manner in which the instruction was imparted by Professor Richter. The history of the blowpipe given by Professor Richter, from which the following account is abridged, is more complete than that which appears in the last edition of Plattner's "Probirkunst mit dem Löthrohre," or in Dr. Aquila Smith's "Blowpipe Vade Mecum." The earliest notice of the use of the blowpipe in mineralogy is probably that contained in the treatise of Erasmus Bartholin, on Iceland spar, which was published in 1670. He remarks that Iceland spar burns to lime before the blowpipe: "*Quippe, cum frustulum hujus crystalli, flammae lampadis per fistulam, qua vitra hermetice occluduntur, animatae, admoverem; mox animadverti redigi in calcem similem calci vivae, etc.*" "Sweden," says Richter, "must be looked upon as the cradle of blowpipe assaying. We find in that country, from the middle of the last to the first half of the present century, a series of distinguished men who paid much attention to the blowpipe, and considered it an essential instrument in their chemical and mineralogical investigations; I refer especially to von Cronstedt, von Engeström, Bergmann, Gahn, and Berzelius." Von Cronstedt was the first who made a portable blowpipe apparatus, or so-called pocket laboratory. Bergmann extended von Cronstedt's researches, and published in 1779 the result of his experiments in a treatise, "*Commentatio de tubo feruminatorio, &c.*" Gahn made numerous important improvements, but published nothing. Berzelius, however, has given to the world the results of Gahn's experience, with many additions of his own. The appearance, in 1820, of Berzelius' works, "Die Anwendung des Löthrohrs in der Chemie und Mineralogie," forms an era in the history of the blowpipe. The numerous translations of the book enabled foreign chemists and mineralogists to take up the subject. The most important additions to the uses of the blowpipe since the time of Berzelius, have undoubtedly been made by Harkort and Plattner. Harkort, while studying at Freiberg, in 1826, hit upon the idea of employing the blowpipe in quantitative as well as qualitative experiments. He began with the silver assay, and described his process in a pamphlet, published at his own expense, in which he promised that the description of other assays should follow. This promise was never fulfilled, as Harkort took a mining appointment in Mexico, and did not pursue the subject any further. Plattner took up the subject where Harkort left off, and not only completed the silver assay, but also discovered methods of making quantitative assays for gold, copper, lead, bismuth, tin, nickel, and cobalt, by means of the blowpipe. He published his experiments in his "Probirkunst mit dem Löthrohre," which went through three editions during his lifetime, and has been translated into several languages. It should be added that a fourth edition was published in 1865, edited by Professor Theodor Richter, formerly assistant to Plattner, and who has now taken his place as professor of blowpipe assaying.

After a short account of the various forms which the blowpipe has taken in the hands of different experimenters, we come to the mechanical means of producing a blast. The use of the blowpipe was thought by some persons to be injurious to the health, and on this account, and because some persons had a difficulty in keeping up the blast, blowing machines were invented. Berzelius and Plattner set their faces against them, because they did away with the great advantage of the blowpipe—its portability. Of late years an india-rubber blower has been invented, which is light and portable, and may be looked upon as the best substitute for the ordinary blowpipe yet invented. It is especially useful in quantitative assaying, where some effort is required to keep up a steady blast for a long time.

With one part of Professor Richter's article, every Englishman who has studied at Freiberg will fully agree. Professor Richter says: "Looking at the extensive field which has been gradually laid open to the blowpipe, and at the perfection to which it has attained, it must appear strange that even now but a very limited use is made of this instrument in mineralogical researches and in chemical laboratories, although one of the greatest mineralogists* says that in its way it has done as much for the chemistry of minerals as the goniometer for crystallography. The reason of this must be in a certain easy-going carelessness, or in an imperfect knowledge of the experiments which can be performed by the use of the blowpipe, or in the want of that knack which the experiments require, though this need not be anything extraordinary.

"It is true that in books on analytical chemistry mention is usually made of blowpipe experiments, and attention is drawn to their importance in qualitative analysis, but the practical instruction is, alas! often very scanty and insufficient; and when one sees the manner in which the blowpipe is used, as well as the nature of the apparatus employed, one often feels oneself unwillingly carried back to the time of Swab and Cronstedt. When to this is added the fear, which is absolutely groundless, that the blowing is injurious to the health, we need not wonder that most people have a very vague idea of the usefulness of the blowpipe, and consider it unworthy of their special attention.

"And yet these blowpipe experiments are especially fitted, more so than most chemical operations, to create a certain mechanical skill, and to exercise and sharpen the powers of observation. What a small quantity is soon found to be sufficient, both as regards the substance to be tested and the re-agents made use of, and how much quicker in many cases is the end attained!

"The remark is often made, and is frequently also found in books, that blowpipe experiments are confined to a very limited circle. Those who see or will only see in the blowpipe a mere jeweller's instrument, may be right, but he who tears himself away from such one-sided views, and, following Plattner's example, uses the wet way also, will soon be convinced that blowpipe analysis has its special advantages.

"The benefits which quantitative assays by the blowpipe offer to the practical miner or smelter scarcely need any special remark. The miner, above all, who rarely has at hand the extensive apparatus and the instruments of a chemical or metallurgical laboratory, finds in blowpipe assaying the simplest mode of testing the results of his labour.

"The chief obstacle to a more frequent and general application of the blowpipe to the uses indicated in the title of this article, lies, according to my idea, in the fact that a person can rarely get the opportunity of obtaining thorough instruction in the use of this instrument. Berzelius,† in his history of the blowpipe, remarks that such assistance is indispensable, and that without it a person cannot get a true idea of the value of blowpipe experiments. The experience that I have had makes me agree fully with this opinion, and I conclude by wishing and hoping that this difficulty will be gradually removed."

A considerable part of the "Festschrift," is occupied by a list of those who studied at the Mining College, from its opening to the end of the first hundred years.

* Fr. von Kobell, Geschichte der Mineralogie, p. 119.

† Berzelius, Anwendung des Löthrohrs, etc., p. 5.

The list gives the name, place of birth or residence, and the present or last situation. The most distinguished name on the list is that of von Humboldt, who studied at Freiberg in the year 1791. The first Englishman whose name appears is John Hawkins; he matriculated at Freiberg in 1786; he afterwards became a Fellow of the Royal Society, and was a frequent contributor to the "Transactions of the Royal Geological Society of Cornwall." In the following year we find the name of James Watt, of Birmingham.

In the first hundred years there have been altogether 2,465 students at Freiberg, besides certain occasional students who did not matriculate, and whose names do not in all cases appear. Of these 2,465 students, 2,333 were Europeans, the rest from all parts of the world, a large proportion being from South America. Then again of the whole number 2,007 were Germans, and 458 non-Germans, or 1,225 Saxons, and 1,240 non-Saxons.

Baron von Beust, a brother of the late Saxon minister, and who is at the head of all mining in Saxony, and rejoices in the title of "Oberberghauptmann," closes the volume with an article "On the Condition of Mining and Smelting at Freiberg a hundred years ago and at present."

We learn from Baron von Beust's paper that in the year 1765 there were in the Freiberg district 185 mine-buildings, and 3,062 men employed at the mines. The production for that year was 3,671 * tons of ore, as sent to the smelting-house, containing 12,023 lbs. (troy), of silver, 383 tons of lead, and 2 tons of copper, the value of which, according to the present scale of payment for ores, would be about £32,600. Against £1,835 paid in dividends, &c., we have payments of calls to the amount of £3,970. Mining in the year 1765 was not so favourable as it turned out a few years later, when several mines "cut rich," especially Himmelsfürst, Bescheert Glück, and Alte Hoffnung Gottes. The average wages of a miner in 1765 were not more than £8 a-year; but it must be recollected that the miners only worked five eight-hour shifts, or "cores," to use the Cornish expression, in the week. The amount paid by the mines to the *Knappschaftscasse*, or provident fund, was at most only £300 yearly, *i.e.*, 1¼ per cent. of the wages, but then the payments to pensioned-off miners, miners' widows and orphans, were very low indeed.

In the year 1865 there were 79 mines at work, with 7,963 miners (including captains and day-labourers). We may add † that in the year 1864 there were only five fatal accidents, although a very large proportion, namely, 3,560 men came into the doctor's hands, either on account of injuries received during their work, or from illness.

The production for the year 1865 was 28,105 tons of ore, containing 69,437 lbs. of silver, 4,344 tons of lead, 73 tons of copper, 179 tons of arsenic. For this the mines received £218,553, besides £755 for sundry products, such as heavy spar, fluor spar, arsenical pyrites, &c. The amount paid in dividends, &c., was £13,267, whilst the calls only amounted to £6,367; the state also paid £1,903 for extraordinary improvements in the Government mine, Churprinz.

The average wages for the year, per man, were £16 10s. It must be recollected, in comparing this with earlier times, that a hundred years ago the miner only worked about 40 hours a week, whereas now he works 66. If a miner, a hundred years ago, had worked 66 hours a week instead of 40, his wages would have amounted to £13 4s.; comparing this with £16 10s., we see that wages have risen 25 per cent.

With respect to the funds of the Provident Society, we find that the owners of mines paid 15 times as much as they did a hundred years ago, although there are only 2⅔ times as many men, and although the total value of the produce has only increased 6⅔ fold. The miners also contributed more largely, and, consequently, the pensions can be made from 2½ to 3 times as much as they were in 1765.

Baron von Beust considers that the price of materials and carriage has risen, on the whole, 30 to 40 per cent. during the last hundred years. For though some things, for instance powder, are cheaper, yet wood, which is so largely used, has become much dearer. However, the mines are better paid for their ore than formerly, and are better off with regard to the payment of taxes; still, in the opinion of von Beust, this does not make up for the increased expenditure in materials and carriage. Since 1765 the principal mines have been deepened to the extent of 100 to 150 fathoms, and more than 100 miles (English) of levels have been driven.

No exact record exists of the amount of machinery employed in 1765, but in 1757 there were only 18 water-wheels working pumps, and 5 working whims. Von Beust puts the total horse-power of the water-wheels for pumping at 180, and of those for winding at 30.

In 1865 there were at the Freiberg mines:—

	Total horse-power.
29 water-wheels for pumping	429
6 turbines ,, ,, ...	190
14 water-column engines ,, ...	416·5
8 steam-engines ,, ,, ...	281
16 water-wheels for winding	155
2 turbines ,, ,, ...	16
18 steam-engines ,, ,, ...	343

This makes a total of 1,316·5 horse-power employed in pumping, and 514 in winding. The amount of machinery used in dressing has also risen very considerably.

In order to lessen the expense of keeping the levels in good order they are walled as much as possible with bricks—to a greater extent, perhaps, than will be met with in any other mines.

Von Beust makes a curious calculation with regard to the Freiberg lodes. He says that in 1765 the value of a square fathom, taken along the lode, may be estimated at £10 7s., whilst in 1865 it was only £6 9s.; putting the average value for the last hundred years of a square fathom taken along the lode at £10 6s.—and for this von Beust gives his reasons—we see that the value of the stuff worked during the year 1865 is very considerably below the average. The reason of this lies only to a small extent in the fact that they can now work ores which formerly were too poor to pay; the chief reason, according to von Beust is, that during the last few years the lodes have become poorer.

We next come to the smelting works, and, beginning with the ores, it is stated that the mines are now paid 12 per cent. higher for the lead and silver contained in the ores than they were a hundred years ago. In those days charcoal and wood formed the chief fuel, now it is coal and coke. The wages in 1765 were very low; a smelter only got from 3s. to 4s. 2½d. a week, whilst now he gets from 8s. 5d. to 10s. 6d. The loss of metal was large, being 4 per cent. of the silver, and 81·5 per cent. of the lead. This enormous loss of lead was caused by the proportion of lead to the silver in the ores smelted being too small, and the lead was worked over and over again. The loss is now 1 per cent. of the silver and 15 per cent. of the lead. The net profit to the Government in the year 1765 was £5,000, now there is a profit of £60,000.

The most important technical improvement in smelting during the last hundred years, was the introduction of the European amalgamation process; some ten years ago it was replaced by other processes. During the last ten years great efforts have been made to neutralise the bad effects of the sulphurous and arsenical smoke given off in treating some of the ores. Although this has been done at considerable expense, it has opened out a new field of usefulness, the profits of which, it is hoped, will compensate for the expense incurred. Among other

* All the weights and measures used in this article have been reduced to English standards.

† Jahrbuch für den Berg-und Hüttenmann, 1866, pp. 60 and 61.

things the following improvements have been introduced:—Rhenish calciners, with a double bed; blast furnaces, with closed breast and water tuyeres; English reverberatory furnaces, lead refineries, and Pattinson's process; flues and chambers for catching the fume.

Among the peculiarities of the Freiberg smelting works we have the extraction of copper from argentiferous copper regulus, by means of sulphuric acid, and the production of blue vitriol, and then again the utilization of the smoke from wasting pyritiferous ores in the manufacture of sulphuric acid.

The production of zinc on a large scale has not yet succeeded, but it is hoped that it will soon become a profitable branch of manufacture.

In the year there were bought 39,108 tons of ore and "sweeps" from home and abroad, containing:—135 lbs. of gold; 80,289 lbs. of silver; 4,446 tons of lead; 139 tons of copper; 1¼ ton of nickel and cobalt; 179 tons of arsenic; costing £26,178.

In the year 1865 the smelting works sold 97 lbs. of gold, 84,149 lbs. of silver, 3,608 tons of lead (in part as shot, sheet-lead, pipe, &c.), 856 tons blue vitrol, 18 tons nickel speiss, 12 cwt. bismuth, 12 tons zinc, 2,095 tons sulphuric acid of 66°, 37 tons green vitrol, 93 tons sulphate of soda, and 500 tons arsenical products. The total amount received for the whole was £392,653.

Fine Arts.

The Louvre.—Another fine new room has been opened in the Louvre; a large square apartment, situated in the Pavillon Denon of the new Louvre, and between the two galleries, appropriated to the French school, opened some time since. It is highly decorated; in the centre of the ceiling is a seated female figure, writing on large tablets, painted in what is called *camaïeu mordoré*, reddish brown tints, by M. Charles Müller. In the angles are four historical pictures, the subjects of which are:—Louis XIV. ordering the construction of the Louvre; François I. in the atelier of an artist, with a sketch of the famous Chateau de Chambord in the distance; St. Louis, with a view of that architectual gem the St. Chapelle, which was built by his order by the side of the Palais de Justice, where he resided, to receive the relics brought from the Holy Land; and, lastly, Napoleon I. decreeing the completion of the Louvre, which his nephew, the present Emperor, accomplished. Around the ceiling are richly-decorated vaultings. The room is surrounded by an entablature, forming a balcony, and above this are eight female figures, representing the fine arts in their various forms, and painted in false niches. On the walls are the battles of Alexander, by Charles Lebrun. The ancient apartments of Anne of Austria, which contain a portion of the classic sculpture of the museum, have been thoroughly decorated, and will shortly be opened again to the public.

Manufactures.

The Results of the Recent Strikes in the Iron Trade.—It is calculated (says the *Colliery Guardian*) that about £300,000 has been lost to the men in wages alone, while the contributions which the union has given to some 3,000 of the 10,000 to 12,000 who have been thrown out by the strike, have not exceeded £10,000, leaving a net loss of £29,000; while by far the greater portion of the men have had no assistance whatever, and have been compelled to endure the greatest privation and suffering. But, in addition to this, by suspension of work for the nineteen weeks of the strike, a sum of about £1,250,000 has been lost to the district, and must have made a great difference to tradesmen of all kinds. There are also secondary losses which will have to be borne. The malleable iron trade has been directed into other channels, and under the most favourable circumstances a long time must elapse before it will be got back again. This means short time even at the reduced wages, and the non-remunerative employment of capital for the manufacturers, with corresponding effects to all who depend directly or indirectly upon the iron trade. The labour market has also been affected in two ways. A large number of fairly-skilled underhands have risen to a foremost place, and the men imported from other districts are far more numerous than are those who have left the north country.

Sugar Manufacture in the West Indies.—The system of sugar extraction pursued in most tropical countries (says the *Produce Markets Review*) is well known to be defective to the last degree, and, in fact, the operation, far from being so easy as to be completely performed by the rough-and-ready way, is a most difficult science, and requires the combined aid of skilled agriculturists, chemists and machinists, to be properly carried out. The waste caused by the present system is something astounding, and has been briefly summed up by chemical authority on the basis of an average yield from the West Indian canes of 18 per cent., thus:—

One-third is left in the megass.....	6	per cent.
One-fifth of the remainder in the skimming	2½	„
One-third to one-half of the second remainder in the molasses	3	„
Leaving for actual sugar exported	6½	„
Total	18	„

It will be remembered that the object of the process is to make sugar; and its result, so far as the West Indies is concerned, is that out of 900,000 tons contained in the canes, 325,000 tons only are exported in the shape of sugar. The value of the sugar in the canes at 25s. per cwt., is £22,500,000. The value of the 325,000 tons of sugar extracted at the same price is £8,125,000; the value of the 150,000 tons of molasses is £1,200,000; of the rum extracted from the skimmings (according to the value of the imports into England), £600,000; or, in short, the planter extracts from his canes £9,925,000 worth of produce, instead of the £22,500,000 he might get. But this is not all his loss, for the produce is so imperfectly prepared that 10 per cent. of the sugar, or 32,500 tons, worth £812,000, drains away on the voyage, and is lost to the West Indian producer—who thus in reality receives in round numbers £9,100,000 instead of the £22,500,000 he might earn. In fact, he loses 60 per cent. of his possible gains. This waste is so great as to be almost inconceivable, and a year ago, when these statements were brought before the West Indian planters, they were dismissed as highly exaggerated amounts by those gentlemen. However, the rapid spread of beet cultivation on the Continent has caused cane planters to look more closely into their system of late, and a great change has taken place in their tone; now that the system is admitted to be imperfect, we may look for rapid improvement, for although Englishmen are hard to convince that anything is wrong, when convinced no nation is so quick in setting abuses right. That it is high time to be up and doing is evident. The Continental beet crop in a few years will probably reach 1,000,000 tons. The beetroot in the best German factories (that, for instance, of Herr Robert, at Seelowitz, in Prussian Silesia), is made to yield 11 per cent. of its weight in actual raw sugar; and advertisements are inserted in the *Journal des Fabricants de Sucre* on the part of Baron Koppy, of Kraïn, Silesia, offering to supply beetroot containing 15 per cent. of saccharine matter. These results have been obtained by careful selection, year after year, of the richest plants, by the most careful agriculture, and by apylying all the resources of chemical and mechanical science to the extraction of sugar; and the advance in the industry may be gathered from the fact that it is not

more than half-a-century old; that the original beet only contained 4 per cent. of sugar; that the per-centage has now increased to 15; and that the quantity of sugar obtained from given quantities of root has been doubled within the last ten years. The cause of this difference between sugar manufacturers in Europe and in the West Indian Colonies is not hard to find, and is simply owing to the coddling system pursued; first, by giving the colonial sugars an ostensible protective duty after emancipation; and then by renewing the protection in a concealed form under the system of graduated sugar duties. But such weak barriers cannot control the great laws of supply and demand. Now that the West Indians find that they have been resting on an unnatural protection, which has become worse than useless to them, let them cast their artificial aids aside, by advocating the removal of the scale of sugar duties. Let them at the same time select the richest sacchariferous plants, study agriculture, practical chemistry, and mechanics, and they will secure a rapid renewal of their prosperity.

Commerce.

Consumption of Sugar.—The consumption of sugar, which is known from official returns to be on the increase in England, owes this enlargement to two distinct sources—to the gradually increasing prosperity of the country, and latterly, to the employment of sugar as a substitute for other ingredients, as for instance, in place of malt, for brewing purposes. To form a fair estimate of the sugar consumption of the whole world is impossible (says the *Produce Markets Review*), owing to the absence of returns of the consumption in the tropical producing countries. For the continents of North America, Australia, and Europe, the returns can be had, and are certainly of an interesting character. The total consumption of sugar for Europe in the past year amounts to 1,600,000 tons, of which 900,000 tons were cane, and 700,000 tons beet sugar; the consumption of the United States is 400,000 tons; the Board of Trade returns give the total for the Cape of Good Hope, Natal, Canada, Prince Edward's Island, Newfoundland, Queensland, New Zealand, New South Wales, South Australia, Victoria, together with the imports of foreign sugar into India, as 100,000 tons. If to these be added 30,000 tons for the maple crop, then is obtained a sum total of 2,130,000 tons to represent the consumption of the civilised world. To this large amount has of course to be added the vast quantity of sugar of home growth consumed in India and the other tropical producing countries in Asia, Polynesia, America, and Africa; but in the absence of all data, any estimate of the total consumption of the world must be a mere guess. The following figures will conclusively show the extraordinary fall that has taken place in the value of sugar during the last eight years. Excluding all considerations of the reduction in the sugar duty which took place in the year 1864, the bonded price of raw sugar in England is now 4s. per cwt. lower than at the corresponding period in 1865; 1s. 6d. lower than in 1864; 6s. 6d. lower than in 1863; 2s. 6d. lower than in 1862; 2s. lower than in 1861; 6s. 6d. lower than in 1860; and 5s. 6d. lower than in 1859. The lowest price of lump sugar, also calculated in bond, is now 2s. less than in 1865; 2s. 6d. less than in 1864; 7s. less than in 1863; 1s. dearer than in 1862; 5s. 6d. cheaper than in 1861; 4s. less than in 1860; and 4s. 6d. less than in 1859. To the consumer at the duty-paid price, the reduction is of course still more marked; and, taken in this way, the English price of raw sugar is 4s. lower than in 1865; 1s. 6d. lower than in 1864; 10s. lower than in 1863; 6s. lower than in 1862; 5s. lower than in 1861; 10s. lower than in 1860; and 9s. lower than in 1859. The consumer of loaf sugar can now buy it at 2s., 2s. 6d., 12s. 6d., 4s. 6d., 9s., and 9s. 6d. cheaper than in the Decembers of the years 1865 to 1859 respectively. The stock of raw sugar in the four principal British ports at the end of the year was 163,086 tons, against 175,167 tons last year; the landings for the fifty-one weeks have been 493,661 tons, against 479,761 tons; the duty-paid deliveries 495,884 tons, against 481,558 tons; and the exports 14,245 tons, against 21,086 tons. These figures show for the four ports a smaller stock of 12,081 tons, an increase in the landings for the fifty-one weeks of 13,900 tons, an increase in the home consumption of 14,326 tons, and a decrease in the exports of 6,841 tons, as compared with the corresponding period of last year.

Cotton in the French Colonies.—Although the herbaceous cotton plant sometimes grows to a height of from ten to twelve feet, it is not when cultivated allowed to exceed four or five feet in height, as in that case its products diminish both in quantity and quality. In Senegal the cotton plant suffers either from excess of humidity or from drought. The French colonies most suitable for the production of cotton are the Isle of Réunion, Tahiti, and Guadaloupe. At Réunion the Indian cotton plant acquires a quality so far superior, that it is with difficulty that the primitive type can be recognised. Cochin China also furnishes a quality of a medium fineness, the demand for which is very important. The cultivation of this plant no doubt exhausts the soil, which requires to be well manured every year. The beautiful sea island cottons are grown in soils moist from the salt sea air, and susceptible of being irrigated during dry seasons; but in order that they should succeed perfectly, it is necessary that they should be sheltered from heavy winds. It generally seems to prefer the vicinity of the sea in dry countries, and the interior districts of naturally damp climates; these facts lead to the inference that it is not merely temperature by which the quality of cotton is affected, but a peculiar combination of heat, light, and moisture. The land for the cultivation of the cotton plant requires frequent labour. The inhabitants of the Southern States of America perfectly understand this cultivation; their example should be taken, and there is no doubt that even with free labour similar results will be obtained in the French colonies.

Sericulture in Austria.—The cultivation of the mulberry and silk industry tends to increase in importance every year in Austria. The produce of cocoons for 1864 is estimated at about 133,347 quintals, about 13,134 tons, including the produce of the Venetian provinces. The rearing of silkworms is more important in the southern provinces of the empire, that is to say, in Istria, Carinthia, Croatia; and that industry has also made great progress of late in Hungary and Bohemia, and is carried on on a large scale in Upper and Lower Austria, and to the south of the Tyrol. A much greater development would have been made in the last twelve years if the disease had not made considerable ravages in all the provinces, where it has even in many places completely put an end to the rearing of silkworms. The disease first made its appearance in Austria in 1847, five years later than in France. The country that has most suffered from it is Hungary.

Colonies.

Iron in Tasmania.—It has long known that iron in almost a pure metallic state exists in different parts of the island, and that iron ores are abundant, particularly in the north. So far back as 1823, Mr. Commissioner Bigge reported to the House of Commons on the iron ore of Ilfracombe, in the West Tamar District. But Mr. Gould, the government geologist, has lately been exploring that region more fully, and made a report to the colonial parliament last session on the subject. He says:—There are four varieties; the principal are earthen brown hematite, crystallised brown hematite

and magnetic oxide; the other, which is earthy red hematite, is of more sparing occurrence, and is evidently a mere derivative from the previous ores. Unlike other iron ores which I have observed in many parts of the colony, and which consist merely of hematites formed by the deposition of ferruginous matter from rocks containing a small per centage of iron as an element of composition, these appear to be contained in real mineral lodes, or to be derived from the contents of such, and their formation appears to have been determined by a mineral force acting in defined directions. The ore is of greatest excellence in the lower ground, that at the extreme upper end being inferior in richness and not quite so abundant in quantity. The ore shows itself to be of good quality, however, for more than one-half of the length of the reef, and even the remainder is at least equal to much of the iron ores smelted in other countries. The average width is about 66 ft., the length outcropping 300 yards, and the average slope about 14°. Taking a rough estimate, this gives the cubic contents of the portion of the vein above the water-level at about 705,800 tons. Assuming that only one-half of this is rich ore, we have an amount of 350,000 tons of rich ore lying above the water level, and presenting every facility for being quarried at an exceedingly low rate per ton, the other moiety presenting equal facilities of working; while every yard in depth below the level would yield, on the same calculation, 20,458 tons.

Water in New South Wales.—On the Darling Downs supplies of water have been obtained from cones, formed of a crust or deposit, from three or four to twenty feet high. This crust is composed of an admixture of hardened clay with small quartz pebbles, much worn by the action of water. When the crust is broken water spurts out in a small and continuous stream. The water is very clear, cool, and fresh. At one of those natural reservoirs about 10,600 sheep are watered daily, and yet the supply from the cone does not seem to be at all affected. These strange aqueducts may turn out to be as valuable to the grazier as they are interesting to the geologist. The pastoral occupants of Crown lands in the Lachlan districts are taken steps towards securing for themselves permanent water supplies.

New South Wales Finance.—According to the financial statement of the treasurer, the public debt of the colony of New South Wales is at the present time £5,634,930, consisting of debentures for £5,240,030, bearing interest at 5 per cent., and treasury bills to the amount of £349,900, bearing interest at 6 per cent. The estimated revenue for 1867 is £2,253,500, and the charges upon it £2,013,992, leaving a balance on the year of £239,513. The revenue received up to the 31st August was £1,240,800, and the estimated amount for the remainder of last year was £786,358, making a total of £2,032,579.

Publications Issued.

Traite des Matieres Colorantes, &c. By P. Schützenberger. 2 vols., 8vo. (*Paris: Masson and Fils.*) An important work on a very important trade—that of dyeing; a treatise on colouring matters, with their applications to dyeing and textile printing; and notices on textile fibres, dressings, and mordants, published under the auspices of the *Société Industrielle* of Mulhouse, and with the aid of the Chemical Committee of the Society, by M. P. Schützenberger, formerly professor of chemistry in the superior school of Mulhouse. The quotation of the above from the title page will recommend this work to all who are interested in the application of colouring matters to industrial purposes. The volumes are illustrated, not only by cuts, but also by specimens inserted in the text. It appears that there was previously no special work on the history of colouring matters in France, and the greater part of the technological treatises which touch the subject were published previous to the discovery of many of the most beautiful artificial colours now in use. M. Schützenberger, whose work now supplies the void referred to, conducted for more than ten years the laboratory for practical instruction in the school of Mulhouse, and should therefore be thoroughly *au courant* with recent discoveries, while the co-operation of the Mulhouse Industrial Society greatly strengthens his position in a practical point of view. Besides describing the various dyes and other matters employed in dyeing and printing, their modes of preparation and employment, M. Schützenberger gives the means of ascertaining their relative purity, and the methods in use for fixing the colours in dyed fabrics. The manufacture of muslins, in which madder colours play so important a part, occupies a considerable portion of the work, and the actual samples of muslin and silk, produced expressly for the work, amount to more than 70 in number. The book comes before the world with a recommendation, by M. Dumas, of the French Institute.

Notes.

Economical way of Preserving Fruit or Potatoes.—Apples, pears, or potatoes may be easily preserved in the following manner:—A dry and well-ventilated place should be chosen, if possible on the ground-floor; on this a layer, about four inches thick, of rye straw is spread, then a layer of fruit or potatoes of the same thickness, and this is sprinkled with powdered plaster of Paris; on this another layer of straw, then fruit sprinkled with plaster, and so on, till five or six successive layers of straw, fruit, and plaster have been formed. In this manner, potatoes may be kept fresh for some time, and the growth of the long white shoots, so detrimental to their nourishing qualities, and which render them unfit for planting, is prevented.

New Gas.—The town of Coburg, Canada West, has been lighted with a new gas, made from pine wood, bones, and refuse vegetable and animal matter. The light, it is said, is quite brilliant, surpassing that manufactured from coal, which had been formerly used, while it will be more economical.

Deposit Bank for Seamen.—The Board of Trade have established at Liverpool an experimental deposit bank, which, it is believed, will be found highly advantageous. No interest is allowed, but a seaman can at once deposit any amount, and withdraw it at a moment's notice, so that there is now no excuse for his trusting it to the care of people whose only object is to plunder him. When a seaman is going upon a voyage he can have his money transferred from the deposit bank to the savings bank, and then interest is allowed at the rate of three per cent. per annum.

Liverpool Gallery of Inventions and Science.—The committee of this institution invite the attention of inventors, manufacturers, and dealers, to the advantages which this institution affords them of exhibiting gratuitously in this great commercial centre, models of new inventions, and objects illustrative of progress in the arts and sciences. No charge is made to exhibitors, the object of the founder (the late late Sir William Brown, Bart.), and of the committee of management being to render the gallery commercially beneficial to exhibitors, as well as a means of affording interest and instruction to the general public. Forms of application for space, and further information, may be had of the honorary secretary, Mr. Astrup Cariss, 3, Cook-street, Liverpool.

Correspondence.

Storm Signals.—Sir,—I desire to endorse the opinion of your correspondent, Mr. Wilson (see *Journal*, 28th Dec.), representing the system of the late Admiral Fitz-

roy for the foretelling of storms, and to express my regret that it has been discontinued entirely, even for a time. It is well known that the Admiral sacrificed a large amount of time and of money in endeavouring to improve the system, and there can be no doubt that, to some extent, he was successful in his predictions, or forecasts, as he termed them. It is my intention to search the records, at some convenient time, for the purpose of ascertaining whether my idea be correct, namely, that in two cases out of three his forecasts were verified by the event, according to his statement in 1862, that "by continued and consecutive series of charts, several hundred in number,—constructed on the synchronous principle,—an insight into the laws of our atmosphere has been gained which has enabled us to know what weather will prevail during the next two or three days, and, as a corollary, when a storm will occur." I hope that, at least partially, the system may be continued as suggested by your correspondent.—I am, &c., Chr. Cooke.

31st December, 1866.

MEETINGS FOR THE ENSUING WEEK.

Mon.....R. Geographical, 8½. 1. "A Journey to Kano from the Inger;" by the late Dr. W. B. Baikie. 2. The Bishop of Mauritius, "On the North-east Province of Madagascar." 3. Lieut. T. H. Lewin, "Diary of a Hill Trip in Burmah."
British Architects, 8.
Medical, 8.

Tues ...Civil Engineers, 8. Mr. John Bourne, "Ships of War."
Statistical, 8. Dr. Mouat, "On Prison Statistics of India."
Pathological, 8.
Anthropological, 8.
Royal Inst., 3. Rev. Chas. Kingsley, "On the Ancien Régime as it existed on the Continent before the French Revolution."

Wed ...Meteorological, 8.
Society of Arts, 8. Capt. Toynbee, "On Mercantile Marine Legislation, as affecting the Number and Efficiency of British Seamen."
London Inst., 6½.

Thur ...Royal, 8½.
Antiquaries, 8½.
Linnæan, 8. 1. Dr. Cobbold, "On *Distoma clavatum* from the Sword-fish." 2. Dr. Cobbold, "Experiments with *Trichina spiralis*."
Zoological, 4.
Numismatic, 7.
R. Society Club, 6.
Chemical, 8. 1. Mr. Thos. E. Thorpe, "On the amount of Carbonic Acid in Sea Air." 2. Prof. Frankland and Mr. Duppa, "Synthetical Researches on Ethers." 3. Prof. Wanklyn, "Laboratory Contributions."
Royal Inst., 3. Rev. Chas. Kingsley, "On the Ancien Régime as it existed on the Continent before the French Revolution."

Fri .....Royal Inst., 8. Prof. Tyndall, "On Sounding and Sensitive Flames."

Sat .....R. Botanic, 3¾.
Royal Inst., 3. Rev. Chas. Kingsley, "On the Ancien Régime as it existed on the Continent before the French Revolution."

Patents.

From Commissioners of Patents' Journal, January 4th.

Grants of Provisional Protection.

Armour plating—3249—W. C. Nangle.
Automatic figures—3278—J. H. Pepper and S. F. Pichler.
Billiards, &c., marking boards for—3294—W. H. Burroughes.
Breech-loading fire-arms, and cartridges and bullets for—3253—W. E. Newton.
Breech-loading fire-arms, and cartridges for—3252—E. J. Warmington.
Breech-loading fire-arms, cartridges for—3183—T. Wilson.
Buckles—3239—H. Southall.
Cast-iron sash windows—3199—V. Vandroy.
Clasps—2892—J. C. Newey.
Combs and hackles, drilling—3087—T. R. and T. W. Harding.
Electro-magnetic and magneto-electric machines—3209—H. Wilde.
Fabrics, pressing the surfaces of—3211—L. Cobe.
Fibres, assorting—3260—J. Varley.
Fibrous substances, combing—3251—W. Hopkinson.
Fibrous substances, combing—3263—J. Studley and E. Jackson.
Fibrous substances, doubling—3250—J. Tolson.
Fire-arms and cartridges—3243—W. Richards.
Fire-arms, breech-loading—3244—H. Dines.
Fluids, heating and cooling—3179—J. A. Coffey.
Furnaces—3197—T. Bridges and J. Bigwood.
Gas—3258—E. S. Cathels.
Glass, ornamenting—3270—J. Robinson.
Grain, cleansing—3033—R. Potter.
Graining, tools for—3235—T. Chaloner and J. Billington.
Green colouring matter—3152—W. Clark.
Hammock cot—3290—A. Woods.
Iron and steel—3280—J. Stenson.
Iron and steel, coating—3047—C. E. Brooman.
Iron—3189—W. H. Richardson.
Lace—3213—W. Selby.
Metallic tubes—3181—J. Horton.
Motive power—3173—W. Clark.
Parallel rulers—3241—J. Davies.
Penholders—3215—J. Darling.
Photographic pressure frames—3221—F. Lane.
Photography, obtaining designs by—3177—D. Winstanley.
Pianofortes—3288—H. Brinsmead.
Pianofortes and harmoniums—3172—E. McLean.
Planting machines—3223—J. Freer.
Plastic materials, articles from 3292—T. V. Morgan and E. Hyles.
Ploughs—3175—F. Volkmann.
Printing—3227—J. and P. Lowe.
Pulleys 3286—T. Andrew.
Pumps—3242—W. Warren.
Railway buffers—3261—T. H. Cooper.
Railway carriages—3256—C. E. Brooman.
Railways, preventing accidents on—3191—W. E. Hickling.
Ropes—3225—W. Guest.
Rotary engines—3207—W. Clark.
Safes—3265—S. Chatwood.
Saw frames, applying motive-power to—3267—J. Robinson and J. Smith.
Scrubbing machines—3282—W. R. Lake.
Sewing and embroidering machines—3284—L. Lindley and F. Taylor.
Sewing machinery—3246—F. Armstrong.
Sewing machines—3185—E. Sang.
Sheep shears—3255—W. Hopkinson.
Ships' capstans—3240—W. H. Biggleston.
Slates, dressing—3268—H. Wren and J. Hopkinson.
Specific gravities, separating substances of different—3205—T. J. Chubb.
Spelter—3117—C. Crockford.
Steam boilers—3027—S. Glenton.
Steam boiler tubes, cleaning—3259—W. E. Newton.
Steel—3203—T. J. Chubb.
Steel 3266—V. Gallet.
Stone dressing—2705—E. W. Uren.
Stoves—3274—C. Sinibaldi.
Studs or nails—3248—C. E. Brooman.
Sugar cane, cutting—3187—F. Kohn.
Tool holders and cutters—3247—W. F. Smith and A. Coventry.
Vessels, propelling—3219—G. H. Phipps.
Water, measuring the supply of—3296—T. Hoey.
Weaving, looms and shuttles for—3217—G. Haseltine.
Weaving, looms for—3254—R. Clayton, J. Raper, J. Goulding, and W. Howarth.
Weaving, looms for—3257—C. E. Brooman.
Weft forks—3184—J. Broadbent.
Window sashes and frames—3264—T. Jones.
Yarns—3231—R. Smith and J. Ramage.

Inventions with Complete Specifications Filed.

Nautical logs—3430—A. B. Ely.
Steam engines—3452—G. T. Bousfield.
Street sweeper—3417—W. Smith.

From Commissioners of Patents' Journal, January 8th.

Patents Sealed.

1781. R. Fowler.
1782. H. G. Fairburn.
1784. J. D. Brunton.
1788. E. H. Aydon and E. Field.
4789. J. A. Salmon.
1790. C. Heptonstall.
1797. J. Murray.
1799. T. Ivers and J. Haddock.
1801. W. Moseley.
1802. J. Elder.
1810. W. J. Curtis.
1813. G. W. Hawksley, M. Wild, and J. Astbury.
1820. C. E. Austin.
1826. J. Moseley.
1828. K. H. Cornish.
1845. P. Ellis.
1853. R. Clough and P. Smith.
1875. J. J. L. M. Lagarrigue and P. A. Castera.
1888. M. A. F. Mennons.
1901. R. Newton.
1921. W. E. Newton.
2039. H. Holland.
2040. G. Davies.
2204. H. A. Dufrené.
2484. F. Haseltine.
2554. G. E. Scarle.
2674. A. V. Newton.
2778. E. Howard.
2924. W. E. Newton.
2926. H. A. Bonneville.

Patents on which the Stamp Duty of £50 has been Paid.

3. J. W. Nottingham, W. H. P. Gore, & A. H. A. Durant.
34. G. T. Bousfield.
90. C. Bartholomew.
18. W. Hall.
28. J. B. Fenby.
37. E. Fairburn.
368. T. White.
48. J. Ramsbottom.
57. P. Walters.

Patents on which the Stamp Duty of £100 has been Paid.

3000. J. Eason.
31. A. Chambers.

Journal of the Society of Arts.

FRIDAY, JANUARY 18, 1867.

Announcements by the Council.

Notice to Members.

The Council have decided to set apart the first Wednesday in each month, during the present Session, for the discussion of various questions connected with Arts, Manufactures, and Commerce; these discussions may commence either with or without the reading of a paper.

Any member desiring to introduce a subject for discussion should give notice of it to the Secretary, and, if approved by the Council, it will be announced in the *Journal* for one of these evenings. The member who opens the discussion must not occupy more than half-an-hour, but will have the right of reply. No division is to be taken.

On the evening of Wednesday, the 6th February, Mr. Henry Cole, C.B., will introduce the following subject:—

"On the existing legal regulations in reference to the Cab Fares in the Metropolis, and their effect in rendering the Vehicles inferior to those provided in other European Capitals and the large Municipal Towns of this Country."

Art-Workmanship Prizes.

The works sent in competition for these Prizes are now placed in the Society's Great Room for the inspection of members and their friends.

Ordinary Meetings.

Wednesday Evenings at Eight o'clock:—

January 23.—"On the Iron Permanent Way used on German Railways." By T. A. Rochussen, Esq.

January 30.—On this evening the Report from the Judges on the Art-Workmanship Competition will be read, and the competitors and their friends will be invited to be present. Sir Thomas Phillips, Q.C., Chairman of the Council, will preside.

Cantor Lectures.

The following is the syllabus of the course of Six Lectures "On Pottery and Porcelain," illustrated by specimens of various manufactures, and by photographs and diagrams, to be delivered by William Chaffers, Esq.:—

Lecture I.—Monday, January 21.

Ancient Pottery.—Introduction. Assyria and Chaldea, Egypt, Greece, Etruria, Rome, &c.

Lecture II.—Monday, January 28.

Maiolica.—Italy, Spain, Persia, &c.

Lecture III.—Monday, February 4.

Fayence.—France, Spain, Portugal, Russia, Sweden, Denmark, &c.

Gres or Stone Ware of Germany and Flanders.

Delft Ware, &c.

Lecture IV.—Monday, February 11.

Oriental Porcelain.—China, Japan.

Lecture V.—Monday, February 18.

European Porcelain.—Italy, Germany, France, Holland, Belgium, Russia, Poland, &c.

Lecture VI.—Monday, February 25.

English Pottery and Porcelain.—Early History, continued to the beginning of the 19th century.

The lectures will commence each evening at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend to each lecture. Tickets for this purpose were issued to each member with last week's *Journal*.

Subscriptions.

The Christmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Sixth Ordinary Meeting.

Wednesday, January 16th, 1867; Rear-Admiral Sir Edward Belcher, K.C.B., in the chair.

The following candidates were proposed for election as members of the Society:—

Agnew, William, Manchester.
Angier, Samuel Haynes, 72, Cornhill, E.C.
Baragwanath, J. P., 153, Upper Thames-street, E.C.
Bingham, Reuben, 1, John-street, St. James's-sq., S.W.
Bonnor, George, F.R.G.S., 42, Queen's-gate-terrace, Kensington, W.
Bradfield, J. E., 2, Strand, W.C.
Chaffers, William, F.S.A., 19, Fitzroy-square, W.
Gard, Richard Sommers, Rougemont, Exeter.
Kitchin, Joseph, Dunsdale, Westerham, Kent.
Lobley, James Logan, F.G.S., 50, Lansdowne-road, Kensington-park, W.
Lubbock, Sir John, Bart., F.R.S., 15, Lombard-street, E.C., and High-elms, Farnborough, Kent.
Middleton, Thomas John, 79, Long-acre, W.C.
Muspratt, Edmund K., New-hall, 41, Old Hall-street, Liverpool.
Ommaney, Rear-Admiral Erasmus, F.R.G.S., 6, Talbot-square, Hyde-park, W., and United Service Club, Pall-mall, S.W.
Paine, Thomas, Banbury.
Pearce, J. D. M., A.M., Craufurd College, Maidenhead.
Ramsden, J. C., Busbridge-hall, Godalming.
Seaton, John Louis, 93 and 95, Hampstead-road, N.W.
Shaw, James Jesse, 2, Hill-road, St. John's-wood, N.W.
Somerton, The Viscount, Roche-court, Salisbury.
Thomson, John Reid, 18, Highbury-place, N.
Ward, John, 107, London-wall, E.C.

The following candidates were balloted for, and duly elected members of the Society:—

Addis, S. J., 49 and 50, Worship-street, E.C.
Becke, John, Northampton.
Bosanquet, Samuel Richard, Dinastow-court, near Monmouth.
Glendining, Alexander, jun., Redleaf.
Jobson, Robert, 32, Great St. Helen's, E.C.
McCrirrick, T. W. Bitterley-court, Ludlow, Salop.

The Paper read was—

ON MERCANTILE MARINE LEGISLATION AS AFFECTING THE NUMBER AND EFFICIENCY OF BRITISH SEAMEN.

By Capt. Henry Toynbee, F.R.A.S., F.R.G.S.

Having spent the last thirty-three years of my life amongst seamen, I have been struck with the importance of some of their wants, and have been trying for some years to get those interested in their welfare to take up the question of their social position, and deal with it in a broad and comprehensive manner.

It is my intention to confine myself to the subject of seamen in this paper, although some important changes might be made in the training and examination of young officers, especially as to hygiene, navigation, and the general government of a ship at sea, where there is no appeal to law.

The scarcity of British seamen, and the tendency to discontent which is showing itself in the east end of London and in several of our seaports, makes it more important that those who understand them thoroughly should come forward and explain what really is wanted, for we can hardly expect a class of uneducated men, many of whom are very much demoralised by the peculiar treatment they have received, to devise and carry out the best remedies for their just complaints, even if the power lay in their hands.

Here let me draw a broad distinction between the reasons for complaint mentioned in this paper, and the suggested remedies. The former are facts to be dealt with, the latter are only the ideas of a single person.

On thinking over the subject it seems that several of the improvements must emanate from our Government, by some slight changes in mercantile marine legislation; and as Mr. Graves, M.P., gave up the idea of a Royal Commission to Inquire into the State of our Merchant Seamen, on the promise that the present Government would go carefully into the subject, this seems to be the time to form a committee of practical men, who are interested in and connected with seamen, with the object of considering carefully what improvements are needed, and then to go in deputation to the President of the Board of Trade to ask him to listen to their suggestions. If I may judge from the way in which Sir Stafford Northcote has publicly asked for information from practical men, and the courteous manner in which he has listened to private individuals, I cannot be mistaken in saying that he will appreciate the endeavours of such gentlemen, and give their suggestions full weight in deciding what is to be done for our seamen.

November 5th, 1866, the Newcastle and Gateshead Chamber of Commerce memorialised the President of the Board of Trade, begging him to appoint an inspector of ships, and a public law officer to inquire into wrecks, from a conviction that an immense amount of life and property is lost from preventible causes.

Again, November 20th, 1866, one hundred and seventy seamen of the north-eastern ports sent in a petition to the Board of Trade, to which I shall allude by and bye. So we have shipowners and seamen petitioning the Board to interfere.

As the question of inspection will come under consideration, it may be well to say that I have read Mr. Gray's deeply-interesting and suggestive paper, on "Mercantile Marine Legislation," which was read before this Society. One weak point in the style of legislation of which he complains, seems to be that room is not left for progress, and it does not seem judicious to legislate absolutely on a progressive science; for instance, the building of iron ships was in its infancy, and the Act might have required three or more water-tight bulkheads, leaving it in the power of Government to require greater improvements in new ships (after giving full notice) as the science advanced.

Then, again, in the inspection of boilers, boats, anchors, cables, &c., where the inspector may be wilfully deceived, it seems that it should be clearly stated that inspection does not relieve the party whose property is inspected from responsibility, just as in the case of troop and emigrant ships, where this is distinctly stated in the charter-party, for we must never forget that the argument of prevention being better than cure is in favour of inspection before mischief is done; and we can well suppose our government saying to shipowners and commanders, "the lives and property of our subjects are of so much importance to us, that we will do all we can for their protection before you sail beyond the reach of our laws, but the responsibility rests entirely with you that the object of this inspection is not evaded." I think all will allow that in every class there are still too many to be found who will gamble with the lives and property of others, if they imagine they can gain by it; and these laws are made to restrain such people. They protect the good and straightforward business man.

The above remarks allude chiefly to legislation on progressive science, in which case it may be supposed that the inspector himself may not be sure that his requirements are the best, but there are some cases in which legislation may have to deal with subjects so well understood as to more nearly resemble exact sciences; such as encouraging any class to be provident, giving limejuice and preserved vegetables to those who live on salt meat, giving human beings dry, light, commodious, well ventilated and drained places to live in, encouraging steady religious habits and social improvements, and keeping up a full supply of men to carry on the commerce and defence of the country.

It is the bearing of our mercantile marine legislation on these subjects, as regards British seamen, which I have undertaken to deal with this evening.

1st. With regard to making our seamen provident. For 104 years Government required each merchant seaman to pay a shilling a month, and each master two shillings, towards the Merchant Seamen's Fund, "for the relief and support of maimed and disabled seamen, and the widows and children of such as shall be killed, slain, or drowned in the merchant service." For 87 years half this money went towards the support of Greenwich Hospital, the rest being left in the hands of local committees to manage, whose rules were based on defective calculations, and they got into difficulties, which led Government in 1834 to give up taking a part for Greenwich Hospital. But even this was not a sufficient remedy, and in 1851 the last resource was to give up compelling seamen to subscribe, and only continue a modified benefit of the fund to those who were wise enough to subscribe voluntarily for the future, after being told that the fund was bankrupt; giving no compensation to men who did not continue to subscribe, even though they might have paid towards it nearly all their lives. The instrument by which this change in the law was carried out is called "An Act to amend the Act relating to the Merchant Seamen's Fund, and to provide for winding up the said fund." It tells us that it "can no longer be carried on with benefit to the British merchant seamen," and that the Queen acts "by the advice and consent of the Lords Spiritual and Temporal and Commons." How these gentlemen soothed their consciences before giving such cruel advice is more than I can understand.

An explanatory paper was circulated, but many seamen never think of examining even their accounts, so that no doubt thousands never knew that any change was made; and it would require a long explanation to prove that Government did not virtually promise to give to each seaman the benefits set forth in the rules of the fund, when it compelled him to subscribe to it. Some millions were paid by the country to buy off slaves, and it would have been but mere justice to have kept faith with her seamen.

I am quite inclined to let bygones be bygones, and only mention this as an argument to prove that our seamen have a strong claim for a well-devised pension fund and life insurance to support themselves and their

families; and there are good reasons for believing that Government is preparing to establish these in connexion with shipping offices, so that now is the time for practical suggestions. They should be adapted to the circumstances of seamen, by allowing long-voyage men to pay lump sums, each payment being a closed transaction; a provision should also be made for the payment of advance notes into the fund or life insurance instead of to the seamen. But the details might be gone into by the proposed committee.

Again, the unclaimed wages and effects of deceased merchant seamen (which it is not necessary to retain for the purpose of satisfying claims) amount to about £7,000 a-year; this is paid into the Consolidated Fund of the United Kingdom, where it must have accumulated to a very large amount since Government first received it. But surely the United Kingdom might allow this to form a benefit fund, to meet the distressing cases which abound in sailors' families.

Again, scurvy has increased threefold in the last few years in our merchant ships. Medical men are unanimous that it ought not to exist, and that it is caused by a continuance of salt food, without good limejuice or vegetable diet, aided, in many instances, by the tendency to fever which is induced by small, damp, badly-lighted, badly-ventilated forecastles.

A paper on scurvy was read a few weeks since, at the Hunterian Society, by Dr. Dickson, R.N., Medical Inspector to the Custom House and Board of Trade. He showed some vile specimens of so-called limejuice, taken from scurvy-stricken ships, and said that even when good, at the commencement of the voyage, it was frequently spoiled by being kept in large casks instead of bottles. We were told of a firm that bought limejuice at 2s. a gallon, and sold it to ships at 1s., after doctoring it. The scientific society of medical men who listened to this paper were most indignant, some even declaring that the owner of the ship in which a man died of scurvy should be proceeded against for murder; this would be extreme, but something must be done. The Secretary of the Board of Trade and the Registrar-General of Seamen have published a most interesting correspondence with local marine boards, foreign consuls, &c., confirming the fact that scurvy need not exist, and I believe they are prepared to take active measures against it.

Then, again, comes the question as to the quality of provisions for seamen. Soldiers and emigrants have good salt provisions, as well as limejuice, pickles, preserved potatoes, &c., and these improvements must be introduced into the dietary scale of seamen. They also need good glazed lanthorns, or lamps, and a certain amount of oil or candles; as it is they generally have open lamps, which are very unsafe; and they are often obliged to burn the fat of salt meat, instead of oil, which gives more smoke than light, adding to the unhealthiness of forecastles.

There are men of high principle amongst shipowners, who, whether they own only half a ship or a whole fleet, are determined to act justly towards those they employ; to them it is only requisite to suggest required improvements; but there are others whose one object is money, and the question is how are these last to be prevented from endangering the existence of British seamen by their treatment of them. Again, there are provisioners who take the smallest possible share in a very large number of ships, with the understanding that they shall have the supplying of the provisions. This is quite right in a business point of view, but the temptation to supply cheap provisions comes heavier on them than on other shipowners.

In my search after facts, I went to one of our very best provisioners, and asked the price of beef that would pass inspection for troops; he answered £9 5s. per tierce of 336 lbs., which for the ordinary tierce of 304 lbs. would be about £8 7s. I then asked what is the price of beef supplied to the crews of ships? He answered, from £5 10s. to £6 10s. per tierce of 304 lbs.

With regard to pork, he said it ranged from £4 10s. to £5 15s. per barrel of 200 lbs.; but he showed me a list of prices from another English port, where it ranged from £3 5s. to £3 15s., but he said this is stuff that you could squeeze through your fingers like lard. He went on to say that in flour, peas, and other stores, a few shillings per barrel were often saved by a close-fisted firm, and he volunteered to say that seamen do suffer very much in times of bad freights; for instance, he himself had just lost the custom of two firms which he could not supply cheap enough, though he confessed he was sometimes driven to sell articles inferior to what he would like to give to seamen, for if he did not, he might shut up shop. When I asked if all these firms improved the quality of the provisions given to their men when freights improved, he gave a significant smile.

Here then we have a difference, depending on the character of the shipowner, of £2 7s. in the price of 304 lbs. of beef, or 2¼d. per lb., and £2 10s. in that of 200 lbs. of pork, or 3d. per lb. These differences exist in the price of food which ought to be about the same quality for all.

I have also received a letter from a London shipowner, in answer to certain questions. He says his firm always gives the best quality of provisions, but he fully confirms the fact that some ships buy the cheapest, and that in London there is a constant difference between the prices of the best and worst as extreme as alluded to above. He remarks on three qualities of biscuit, viz., royal navy (very good), navy (a second quality), and ship (lower still), but he does not give the prices. He says they give 2s. per gallon for limejuice, and 4s. each for five-gallon jars to pack it in; but he adds, stuff called limejuice may be had at 6d. per gallon. To enable you to understand the paltriness of this saving, you must know that a gallon of limejuice is more than the allowance of a seaman for a voyage to India and back. He tells me that American ships seldom take limejuice, but potatoes, dried apples, beans, pickles, corn flour, and biscuit equal to our "royal navy," so that scurvy is rare with them.

I may add that the agents for Government emigration have been so troubled by the provisions for seamen being worse than those for emigrants, that they have a clause in the charter-party requiring them to be of the same quality. Not (as they say) because they have any interest in the seamen, but merely to protect the emigrants from getting worse provisions, or the risk incurred by the seamen's discontent.

Then, again, comes the question of forecastles. By Act of Parliament seamen should have nine superficial feet of deck if they have hammocks, and 12 if they have bunks—but nobody measures it; whereas emigrants have 15 ft. Again, soldiers have from 10½ to 22 superficial feet, depending upon whether they are in health or sick. It has been proposed by Mr. Mackay, a large shipowner, that seamen should have 15 superficial feet, that their light and ventilation should be under the control of Government, and that something should be done to prevent the sea from washing them out of topgallant forecastles when the cables are bent. He says, "at present in flush-decked ships the forecastles, which are under two decks, have neither light nor ventilation, while topgallant forecastles are generally so much exposed, as to set even decency at defiance;" and ends a graphic letter on the subject by saying, "shipowners have a right to see sailors lodged at least as well as their dogs and pigs, and then they may probably hope to see them more under the influence of sober reason than the recklessness of wicked instincts."

I have myself seen sailors' chests and beds filled with water in at the hawse holes of topgallant forecastles, and know that commanders are frequently prevented from bending their cables so early as they otherwise would, and ought to do, on account of the discomfort caused to their crews by the seas coming in at the hawse holes. A simple remedy is a good manger, with scuppers

to carry off the water; and I have heard of another means of prevention, but have not seen it. I have also seen forecastles of both kinds, and seamen's chests black from the gas which rises from cargo; it rubs off on their clothes and smells like sewage; this is especially the case in sugar ships, which are not allowed to carry soldiers. Again, I have seen a place containing two packs of fox hounds and three horses, which received half its ventilation by a hatch which opened into the sailors' forecastle, whereas an air-tight shaft would have carried the awful smells which rose from them on to the upper deck. An air-tight bulkhead was built between these creatures and the passengers who lived on the same deck. Now it is well known that the gas which rises from cargo may be prevented from coming into the forecastles by stopping up the air holes (for ventilating the ships timbers) which open into it. The hold may be ventilated by tubes, which pass through the covering-board on to the upper deck. It must be borne in mind that this state of things exists in first-class ships.

Government has so far interfered with respect to forecastles that they are required by Act of Parliament to be properly constructed, ventilated, &c., but the sailor does not know it, and nobody sees that it is done. Again, the articles of agreement, which are signed before a shipping master, contain a printed scale of provisions; it is true there is a note saying that Government does not fix this scale, but the sailor is told that the shipping-master is there to see fair-play between the shipowner and the seaman, he also signs the agreement, which implies that all is right; and if the sailor complains to the captain, the shipping-master's signature is sufficient argument against him. Hence the practical effect is that the shipping-master's signature protects the shipowner from the necessity to make any improvements, which would, of course, entail a slight amount of change in the ordinary routine of a very active business, and the result is they are not made.

How is any change of diet to be brought about? The scale of provisions is printed by Government; the sailor cannot change it; the shipowner's conscience is quieted by the shipping-master's signature, and nothing is done except by the few who take an interest in their men.

To bring about the required change, I would suggest that the Board of Trade call upon all local marine boards to send in a revised scale for merchant seamen, and that the Act be so altered that they be empowered to require the scale they fix upon, or equivalents, to be given to seamen. The following scale is one which my experience has proved to work well:—

	Bread.	Beef.	Pork.	Flour.	Peas.	Tea.	Coffee.	Sugar.	Water.*	Suet.	Raisins.	Preserved Potatoes.†	Preserved Meat.	Pickles.	Mustard.	Lamp Oil.	Coffee or cocoa at daylight to all hands in port, and the watch on deck at sea, a pint each; crew to find water.
	lb.	lb.	lb.	lb.	pt.	oz.	oz.	oz.	qts.	oz.	oz.	oz.	oz.	pt.	oz.		
Sunday	1	1½	—	½	—	⅛	½	2	3	1¼	2	4	8	—	—	1 pint per lamp per week.	Vinegar, Sugar, and Limejuice, as by Act of Parliament.
Monday.....	1	—	1¼	—	⅓	⅛	½	2	3	—	—	—	—	½	1		No Grog allowed, except as an Extra, which may be stopped as a punishment.
Tuesday.....	1	1½	—	½	—	⅛	½	2	3	1¼	—	—	—	—	—		⅛ gill of Rum daily at sea.
Wednesday..	1	—	1¼	—	⅓	⅛	½	2	3	—	—	—	—	—	—		1 ,, ,, in port.
Thursday ...	1	1½	—	½	—	⅛	½	2	3	1¼	—	4	—	—	—		
Friday.....	1	—	1¼	—	⅓	⅛	½	2	3	—	—	—	—	—	—		
Saturday....	1	1½	—	½	—	⅛	½	2	3	1¼	—	—	—	—	—		

* An extra pint of water daily in the Tropics. † Extra water for cooking, ½ pint.

SUBSTITUTES.

1 oz. of coffee, or cocoa, or chocolate, may be substituted for ¼ oz. of tea; molasses for sugar, the quantity to be one-half more; 1 lb. of potatoes or yams, ½ lb. of flour or rice, ½ pint of peas, or ¼ pint of barley may be substituted for each other. When fresh meat is issued the proportion to be 1½ lbs. per man per day in lieu of salt meat; vegetables as above in lieu of flour, rice, and peas; beef and pork may be substituted each for the other. 1½ lb. of butter may be issued in lieu of 3½ lbs. of meat by mutual agreement. 3 oz. of compressed vegetables, or 8 oz. of preserved vegetables, may be substituted for preserved potatoes.

Then, again, how is the Act relating to forecastles and provisions to be carried out? Direct inspection as to the fittings, drainage, light, ventilation, and size of forecastles would answer every purpose, for all parts can be seen, and when once fitted they are not likely to get out of order during the voyage. The number of men it may contain might be painted on a bulkhead after the fashion of public carriages. With respect to provisions, inspection, without relieving anybody from responsibility, might answer, as it does with troops and emigrants; notice the effect on the quality of beef and pork supplied to them; this method has the advantage of preventing seamen from complaining.

I have read with deep interest a memorial signed by 170 seamen of the port of Seaham, and sent to the Board of Trade. These men write most respectfully, and complain that ships go to sea under-manned, not seaworthy, with bad boats, and small, leaky forecastles; they say that by these means a large amount of life and property is lost. They go on to ask for the same protection which Government has found it requisite to give to the working classes on shore.

Fully alive to the great difficulties and responsibilities which a Government undertakes, when legislating so as to affect the freedom of private transactions, I still think that the answers given to these men were not satisfactory. They were told that Government cannot interfere in the manning of ships; that sailors are not obliged to go in unseaworthy ships, with bad boats, and unhealthy forecastles, and that Government cannot interfere, until it has been proved that sailors have failed in trying to get redress. Practically this seems to tell the men to strike; for suppose, in the case of Seaham, only half the ships were well found; after they are manned, the unseaworthy ships want crews, and the unemployed seamen want ships, and if they cannot get ships, in a few days they will want food; the comforting advice they get from head quarters is, "Don't go in bad ships," that is, strike and starve.

Why did a deputation go to Lord Derby a few days ago about better buildings for the working classes? Why is there an inspection of public carriages, factories, mines, the weights, measures, and even the meat in our markets? We might say, people on shore are not obliged to take bad houses, to overwork in unhealthy factories or mines, to ride in overcrowded carriages, to buy of dishonest traders, or purchase unwholesome meat, for they have the laws to go to for protection. Still in practice it has been found that the working classes must yield to what is customary, however bad, so that Government has to interfere and change bad customs.

Now sailors need this interference more than landsmen, for it is impossible that they can themselves inspect the ships in which they are going, or the provisions;

and when once at sea, they have no redress, and cannot escape, even though their forecastles may be uninhabitable, and their meat that very stuff salted, which would have been seized and buried had it been exposed for sale in the markets on shore.

The present state of forecastles, bad quality of lime-juice, and of some ships' provisions, together with the three-fold increase of scurvy, show that the let-alone system has not worked well in our mercantile marine.

But as some think the routine inspection of every ship is ineffectual, and as in practice I have always found that the best way of governing men is to let them know their rights, making them aware at the same time that it was my full intention to make them do their duty, it might be well that the heading of a ship's "Articles" should contain some of the important rights of seamen, such as a new scale of provisions, to be of good quality; the size, light, ventilation, drainage, fittings, &c., required for forecastles; these will suggest the few very inexpensive changes needed; and when it is generally known what should be done, it will be done, for there is not one of these changes which our first-class shipowners will not allow to be reasonable, for some of them give them already. This will make it requisite that the shipping-masters shall be empowered to have an inspection of provisions, forecastles, &c., when a reasonable complaint is brought to their notice.

Sir Stafford Northcote, in his speech, when visiting the training-ships of Liverpool, remarked upon the splendid accommodation given to the poor boys on board, which led him to ask if the shipowners had taken care to provide them with similar accommodation when afloat. No reply was given to this most practical question. Again, in the account of the opening of the *Chichester*, a training ship for poor boys in London, we were told the cheering fact that she was started because most of the destitute boys show a decided taste for the sea; and if their country and employers will consider their wants as they grow from boys to men, single, married, and worn out, then they will continue useful members of society. Sir Stafford Northcote's speech on this occasion gives proof that he is fully awake to the real wants of the merchant service, and supports the conviction that something practical will soon be carried out.

It must never be forgotten that by becoming a sailor, and being provided for from a child, a boy does not acquire that habit of providing for himself which naturally grows on a landsman; in fact the circumstances of his most useful profession launch him into the world a man in appearance, but a perfect child as to management; this weakness is called open-heartedness, and gives that charm to his character which his country men and women admire, but have not provided against; when he comes on shore he really is like a shell-fish that has crept out of its shell; and, unfortunately, he supplies abundant food for thousands of land sharks, who are a nuisance to our sea-ports, but who will decrease if you will help sailors to face their difficulties.

Up to the present time the sympathies of the nation seem to be with the "Comical Sailor," who drinks too much grog, dresses extraordinarily, rolls as he walks, chews tobacco, and takes a coach for himself, another for his hat, and another for his stick—not with the steady married sailor, who, on going to sea must leave his wife and family unprotected. In fact, it would seem as if the idea that we have descended from monkeys was (in the public mind) illustrated by sailors, and that they were not yet fit to be treated as human beings. If this were the case once, the strictest disciples of this theory will allow that there is progress, and we are prepared to prove that British seamen have arrived at such a stage that they will be very grateful if you will treat them like men.

Again, the "Act" requires that seamen shall be paid part of their wages directly their services are no longer required, the rest to come to them on pay day, *i.e.* from three to five days after the ship's arrival. This giving part of the pay on arrival is not done by very many shipowners, because the sailor does not know that he has a right to it. A simple remedy would be to enter the requirement in the heading of the "articles." Few are aware that after seamen have served a shipowner for months, or even years, the custom is to turn them adrift without a penny of their wages, and to leave them in this state from three to five days. The result is, they are generally driven to borrow from men and women who live by demoralising and fleecing them.

Again—married sailors, and those who have friends living at a distance from the port of arrival, suffer extremely by being kept waiting from three to five days until pay-day. They are necessarily idle, and surrounded by powerful temptations. We once heard a shipowner say, when a pressure was being made to pay the crew of a ship two days earlier than usual, that the interest of £1,000 for two days was worth something, so he checked this hurry, but he would not have done it had he known what misery the delay created. A very simple sailor's view of the question is, to do as the Royal navy does, viz., pay seamen including the day on which they receive their money; this would reduce the number of days they would have to wait.

But this waiting, doing nothing, has so baneful an influence, that Mr. Greatorex says, "A sailor must not have to wait at a sailors' home or boarding-house until he is paid off before he can go to his family. The chief mischief arises within twenty-four hours of his first putting foot on shore." It is true, these men come on shore after a long voyage with the best intentions, but these painfully trying circumstances beat them. As a remedy, I propose that Government provide dock clerks in connection with shipping offices, whose duty it shall be to visit ships as they enter the docks, and when the crew have made the ship fast, and are no more required, to request the captain to muster them, and see that each man gets part of his pay at once; to get from the captain a book containing a list of all claims against the crew for slops, fines, stoppage of pay, &c., &c.; to read over these claims to the crew, and take their signatures; he might also enter into this book the date each man commenced to serve the ship, and then there could be no further dispute as to wages. This book might be carried by the clerk to the shipping office, and be considered as the sailors' signature to the release after the shipping master had received his wages. Then let this clerk offer to take the address of any man who wished to go home to his friends, promising to send the rest of his pay and papers after him by post.

This would add immensely to the social improvement of seamen and their families; and they are so useful to the country that they deserve this care, especially when we remember that it is the circumstances of their profession which rob them of the habit of caring for themselves. I myself have strongly felt this inaptitude for managing on shore. Here, as in spiritual things, the children of darkness are wiser than the children of light; the crimps and bad women are on the *qui vive* to be down on their prey; let Government take a lesson from them, and provide children of light in the shape of dock clerks.

A case in point will illustrate the want:—Last November a sailor arrived in London after a voyage of two years; his wife was at Shields; she came to London, found him at the "Sailors' Home;" had to take lodgings, and they were detained two or three days waiting for his pay before they could start off to their family at Shields, of course, complaining bitterly of their expenses. This woman knew the sad temptations to which her husband would be exposed, and took the wisest course, for numbers of husbands yield, causing untold misery, and those who have felt what these temptations are will be the last to cast a stone at the poor fellows.

The Board of Trade has made some useful steps in this direction; let us hope they will go on. They have seamen's savings' banks and money orders, which latter

they have extended to several ports on the Continent, and are going to extend to fifty more. Sailors send large sums home. Each voyage mine have sent from twenty to forty pounds, besides half-pay.

Besides the above causes, the relative decrease of British seamen and their deterioration in ability, may be ascribed to the doing away with compulsory apprenticeship. By referring to data supplied to me by the Registrar-General of Seamen, I find that in the last 16 years our apprentices have decreased from forming 20 per cent. to being only 9 per cent. of all hands employed in vessels belonging to the United Kingdom; whilst in the last 14 years foreigners have increased from forming 4 per cent. to being 9 per cent. of all hands employed in vessels belonging to the United Kingdom. Again in 1858 we had not half so many foreigners as apprentices and boys; whilst in 1865 we had 217 more foreigners than apprentices and boys. Lastly, in 1858, 14 per cent. of our A.B.'s (able-bodied seamen) were foreigners; whilst in 1865, 22 per cent. of our A.B.'s were foreigners. These facts plainly show that we are fast growing to depend on foreigners for our merchant seamen, who, in case of war, might man the ships of an enemy, but not our own. If it be decided that compulsory apprenticeship cannot be again resorted to, it then becomes a question for Government to decide how English boys are to be turned into sailors to work our ships, instead of introducing foreigners.

In these days of free trade, when competition is so painfully strong, if shipowners find foreigners cheaper than apprentices, public spirit must not be expected from them. There are lots of English boys who wish to go to sea, and England wants them. The idea of training ships is, I believe, receiving careful consideration; and if the boys from these ships are not sufficiently popular to induce shipowners to take them, then Government will have to consider what advantage shall be given to ships who carry apprentices without their paying premiums.

The next question I propose to deal with is the social condition of married men and their families. Its importance outweighs that of any other which I have brought to your notice. In their treatment the fixed laws of human nature have been as much neglected as nature's physical laws would be if we tried to confine high-pressure superheated steam in a tin boiler, or if we stowed our gunpowder in the oven.

Is there one gentleman in this room who is not married, or has not thought of marriage, and what is the effect on a nation or class if obstructions are thrown in the way of marriage? Your own minds answer the question better than any amount of words. The East-end of London and our seaports are running over with vice, the result of this restriction on seamen; and if Government passed a law to shut up all houses of bad fame and gin shops to-morrow, they would not check the vice; this shows the weakness of laws for which a class is not fitted, and that part of a Government's work is to improve the characters of its people. Christianity (hand in hand with its child, social science) must prepare a people's minds; it is by this means that the character of the nation has been gradually rising and fitting different classes for improvement; and let us hope that they are going to begin the Herculean task of cleaning those Augean stables, our seaports.

Even now our best and steadiest seamen are men who have married, who can leave their wives and families with half-pay and comparatively well-placed, such as living with their relations, &c., showing that there are no invincible difficulties in the way of sailors marrying. But the amount of misery and vice which are induced by leaving women without half-pay (a number of shipowners will not give it), crowded a whole family in one room which is not properly fitted, surrounded by the strongest temptations to do wrong, is beyond the power of ordinary conception.

Something must be done, and let us hope that Government, shipowners, merchants, and the public will each and all give a helping hand; it is not money as a gift of charity, but due consideration, that these people want.

In these times of steam and telegraph, when monthly notes can be quickly stopped if seamen run away, they ought to be given. I have never lost by giving them, and if the risk to others is so very great it might be insured against. At any rate, this misery should not be allowed to go on. But there are two sides to this question of desertion. It is true that in Canada and some of our gold colonies, where labour and seamen are scarce, the love of change, together with the promises of bettering themselves which the crimps hold out, do lead many seamen to desert from good ships, but it must be borne in mind that the crimps may be said to depend for their livelihood on ships changing their crews, and much of the fault is theirs.

But there are other ports, such as Calcutta, where native labour is very cheap, and seamen can be obtained at as low or sometimes lower wages than in England. There a seaman costs his ship about 2s. or 2s. 6d. a day, whilst a native can be got for sixpence. This offers a premium to commanders to bring about desertion; and it is notorious that some commanders, voyage after voyage, part with nearly the whole of their crews as soon as possible after the ship's arrival, whilst others never lose a man.

If, by harsh treatment, desertion can be brought about, all the better for the ship, as the owner gets the balance of a deserter's pay, and his clothes if he leaves any; but if this happy result cannot be effected, then the next best thing is to discharge the men by so called "mutual consent," and ship another crew just before leaving port at perhaps a lower rate of wages. The result of this pernicious system is, that whilst seamen are scarce in England, they are too abundant in Calcutta and other ports, where thousands are driven to spend several weeks amongst cheap drink, strong temptations, and bad climate, which help to destroy both body and soul. I do not say that shipowners instruct their commanders to treat their crews in this way; perhaps most of them do not know it. It is the fault of commanders being anxious to reduce their expenses as much as possible; and we have known cases where they bragged of the results. The effect of this is, that shipowners will not give half-pay to the wives and families of seamen, and we have known commanders advise them not to do so.

Far be it from me to teach commanders to neglect the owner's interest; one of my first lessons to officers has been that the object of the voyage is to make money; but it would be far better to die than to make it in such a way as this; and the man who will rob his crew to serve his employer, will rob his employer to serve himself.

I would suggest as a remedy that shipping-masters may be empowered to require that a commander shall ship another immediately on discharging a man abroad; and that vessels engaging a crew to be discharged abroad, shall be responsible that they get ships, or send them home, in spite of any agreement to the contrary; and again, that the wages and effects of deserters (less any fair claim the shipowner may have for reimbursement) shall go, with those belonging to deceased seamen, and help to form a benefit fund for sailors and their families.

Then again, Alderman Waterlow has shown us that good dwellings can be built for the working classes to pay full five per cent. to the builders; and I beg the friends of seamen to start a company to build married sailors' homes, giving them and their families the full value of their money. Now, I see by the Merchant Seaman's Act, 1854, that by the consent of her Majesty's Secretary of State for the Home Department, public lands in seaports may be granted for the building of sailors' homes, and I would ask Government to aid this movement by granting a piece of land for a married sailors' home. You have built them for single men;

but, like other sea creatures, a sailor goes through various transitions, so that when he leaves his sea-shell he needs a land-shell to live in. Thus, you have provided for one stage of his existence, but you have quite forgotten that he has another, which is really one great cause of the misery we complain of.

Mr. Greatorex, Chaplain to the Sailors' Home in Wells-street, has supplied me with a case in point. He says, "I have never known, neither have I heard of a sailor's wife misconducting herself if she was a steady woman before they married; they will bear the greatest privations." He then gives a case of a woman (the wife of an A.B.) of unimpeachable character, with five children in one room, without half-pay, almost without clothes, she covering umbrellas at 2s. a dozen, which brings in on an average 4s. a week. She had six articles of clothing for the four younger children, and three for herself, including her stays. The eldest boy earned 2s. a week. There were six other families in the same house, so that those who think that our building commodious homes and letting them for the same money as they are now paying would be bringing them too close together, ought to go and see where these people are now. Mr. Greatorex ends his letter by saying "They are always packed far closer in the houses they live in than they could by any possibility be in any married sailors' home."

The result of these restrictions is that numbers of sailors dare not marry; and the women with whom they are brought in contact are a disgrace to the animal kingdom. A sailor may love his parrot; and I have seen one cry over his dead cat; but he cannot love the woman who dupes, drugs, robs, diseases, and leaves him minus the best part of his clothes. We must remember that these wretched women die off quickly, and there are young children now training to take their places. Any human being with a spark of Christian feeling must grieve over this state of things.

What, if we have discovered by the decomposition of light what the stars are made of, and are making rapid strides towards understanding the laws of nature, are we to rest satisfied, and plume ourselves on our progress, with whole classes of our fellow-creatures morally rotten, who could be elevated if we would treat them in accordance with, instead of contrary to, the laws of our nature. It is a curious fact that France is just discovering a want of men, and encouraging marriage in the army at the age of 24, whilst our own army is suffering sadly from the restraints on marriage, and we have 22 per cent. of our A.B's foreigners, which seems to point to the fact that we have been making a great mistake in discouraging marriage. In spite of all first appearances, every new truth that is elicited on a subject tends to prove that we gain by doing right.

Another great want is Sailors' Institutes or Clubs, like the one in Shadwell; they are especially needed for sailors belonging to ships in ports which are not their homes. For instance, Calcutta has generally 3,000 seamen on board ships in the port, who go on shore for recreation. The "Home" provides for the two or three hundred who must live for a short time on shore, but not for the 3,000 afloat. Sir John Lawrence has kindly granted a fine playground for seamen, and said that he saw no reason why an Institute should not be built upon it. This would be a grand step. How much good would be done if other governments would follow his enlightened example.

Lastly, the religious improvement of seamen is chiefly in the hands of their commanders and officers, though owners can do much. The few zealous ministers who are devoted to them whilst they live on shore, are unanimous in saying that the social improvements for which I have been pleading are absolute necessities, before any real progress can be made in the moral and religious elevation of the British seaman.

Allow me to add that I am opposed to mere giving of money (so-called charity) for the improvement of our seamen. What we need is that style of heart and head work which may lead them to spend their own money well. We want to divert the immense sums which they waste on vice to the support of themselves and their families respectably.

Still, as thousands of our seamen have not had the opportunity of providing for their old age—there are 3,000 in workhouses—let me call your attention to the Belvedere, a kind of Greenwich Hospital for aged and worn-out merchant seamen. It is a child of the Shipwrecked Mariners' Society, and after struggling for ten years to get into existence, canvassing nearly every seaport of this wealthy nation, it has, by begging, borrowing, and lastly by going far beyond its permanent means, been able to admit the magnificent number of twenty decayed seamen into its home, and gives to six others out-door relief—a specimen of the unpractical, useless character of that sympathy, so often unmeaningly avowed, for sailors in this maritime country.

Do not mistake me, it is not for London alone; these twenty have been admitted from various ports in Great Britain. I confess to a feeling of shame whenever I think of this small result, but trust that better days are in store for poor Jack. Moreover, although merchant seamen subscribed for 87 years to the support of Greenwich Hospital, the Belvedere committee were refused the loan of surplus tables and forms, &c., which lie perfectly useless there.

And now, gentlemen, are you surprised that, after treating them contrary to most of the laws which govern human nature, our seamen are reckless? Could it be otherwise? But the hardest feature of the case is, that many of their employers say, "Sailors are so reckless it is no use trying to improve them." On the contrary, my wonder has always been how they continue to behave so well.

We need nearly 350,000 seamen to man the ships of the British empire. At this moment our sailors are spread over the whole world, doing most important work for their country, therefore they cannot combine to ask for improvements, but I promise, from a thorough acquaintance with them, that if you will treat them like men, you will never want British seamen.

I will now close with a summary of the changes proposed.

1st. That Government will establish a pension fund and life insurance adapted to the circumstances of seamen and their families, in connection with shipping offices, and join on to them a benefit fund, the principal of which shall be the sums which Government has received, and is still receiving, as unclaimed effects of deceased seamen. Also, that the "Act" be so modified that the wages and effects of deserters shall go to this fund. Also that Government will consider in what way they can discourage giving a month's advance before starting, except as a payment into the pension fund or life insurance.

2. That Government shall put a stop to scurvy in the mercantile marine, by calling for and entering in the heading of the "articles" a new scale of provisions.

3. That they shall increase the space given to seamen to 15 certified superficial feet of deck, and not less than 90 cubic feet of air: also that they shall require the forecastle to be properly lighted, drained, ventilated, and protected from the sea, as well as from the gas which rises from cargo. Safe glazed lamps and oil or candles to be provided for use; and these rights of seamen to be entered in the heading of the "articles of agreement," and a copy hung in the forecastle.

4. That dock clerks be attached to shipping offices, whose duty it shall be to visit ships on their arrival, see that the crews get part of their pay, and, if they wish, send them to their homes, promising to send the rest of their pay and papers after them.

5. That shipping-masters shall be empowered to order the inspection of all ships' forecastles and provisions, or at least those of any against which there is a reasonable

complaint. Again, that shipping-masters abroad be empowered to make commanders ship another man immediately in the place of the one discharged. Also that vessels engaging crews to be discharged abroad shall be bound to provide them another ship or pay their passage home.

6. That Government be moved to provide for the admission of English boys into the mercantile marine, as a means of national defence in case of war, as well as an honest employment of her subjects, instead of allowing them to be supplanted by foreigners.

Lastly, that Government be asked to grant public lands in our seaports for married sailors' homes, sailors' clubs or institutes, and to encourage in every way the social improvement of seamen, who suffer great temptations and privations from the peculiar circumstances of their profession.

In conclusion, I thank the Society of Arts for this opportunity of making known the wants of seamen, and beg that if they consider that a true bill has been made out, they will help to form a committee, and carry out the ideas suggested in the early part of this paper, as we cannot hope that these changes can be effected by the seamen themselves, who so much need them.

DISCUSSION.

Commander Dawson, R.N., expressed his sense of the great ability and moderation with which Capt. Toynbee had brought before them some of the abuses existing in the mercantile marine. Happily, the question of higher wages did not arise. All they required was a little honesty and fair dealing, so as to enable the seaman to use his money to the best advantage. It was right, at the outset of a discussion of this kind, that it should be understood that they did not attack individuals, but the system. There were many very humane, honest, and high-minded shipowners and commanders who did the best they could for their seamen; at the same time, he thought there could be no doubt that these were in the minority. The evils complained of had been in a great measure handed down from past generations, but it was the fault of the present generation if it did not endeavour to raise the position of the seaman and remedy the evils of former times. Captain Toynbee had almost entirely confined his remarks to the state of things with regard to first-class ships, which, however, constituted only a small minority. The larger number trading to all parts of the world were a low class of ships, and the state of many of them, he did not hesitate to say, was disgraceful to the flag under which they sailed. Having referred to Mr. Charles Dickens's graphic description, in the "Uncommercial Traveller," of the "Tasmania's cargo," showing the frightful results of bad food and insufficient accommodation upon the health and life of the passengers, Commander Dawson remarked that that state of things, he believed, prevailed, more or less, in all the low class ships of the merchant service. It was recorded that on the average two cases per week of seamen, perfectly prostrate from scurvy, were received on board the *Dreadnought* hospital ship; but he believed the number of such cases might be estimated at a thousand rather than at one hundred per annum in the Port of London alone. At the same time there were numerous cases of scurvy which did not result in utter prostration. The symptoms were often very obscure at first, and the medical officer of the Seamen's Hospital at Calcutta had stated that he never thought of treating seamen without keeping scurvy in view, feeling, as he did, that the disease might have entered the system, though it had not fully developed itself. At the same time it was a remarkable thing that the dietary scale of the merchant service was very liberal as regarded quantity, when compared with that of the Navy. The great difference must then be in the quality of the provisions, and perhaps one or two items of diet omitted from the former. The great want in these dietaries was that of a small quantity of fresh provisions, and it was most important that the limejuice, which only cost two shillings in a voyage to Calcutta and back for each man, should be good; also that a small amount of vegetable food should be added to the present scale. It was estimated by an authority on these matters that the expense for a voyage to Calcutta for a proper amount of fresh provisions was £1 per man, which, with one shilling for limejuice, only made a guinea, and this small sum would get rid of a great deal of this disease. It was to be remarked that scurvy among seamen was almost exclusively confined to British merchant-ships; it was nearly unknown in the French and Spanish services; it was also very rare in our own navy. With regard to the case of the seaman when in port, it was a scandal that he should be forced by a concurrence of circumstances into the vices and evils complained of—that at the end of a long voyage he should be turned adrift penniless into the streets of London for four or five days pending the payment of the wages due to him for the labour of months, perhaps years, leaving him a prey to crimps to supply his necessities in food, clothing, and lodging. In return for this they drugged, robbed, and diseased him, and when he shipped again for another voyage, on the first occasion for any great exertion, he broke down from the effects of maladies contracted while on shore. Many of the evils complained of, he felt convinced, were attributable to the system of not paying the men at the time of their arrival in port, and on that account he was in favour of the appointment of dock clerks, as recommended by Captain Toynbee. He also thought that a system of medical inspection on shipping the crews, as was the case in the navy, was desirable, as it would to a great extent prevent men going to sea in a state unfit to perform their duty. His own opinion was that the suggestions made by Captain Toynbee met very fairly most of the requirements of the case, but if they did not, it was the duty of those who were interested in this subject to suggest other means, for it was clear that something must be done.

Rev. John Scott thought it objectionable that particular spots in London should be constituted shipping offices for the payment of crews of vessels, inasmuch as they would form rendezvous for crimps and others, who preyed upon the sailor on his coming ashore. In addition to the dock clerks suggested, he thought it was desirable that wherever there was a shipping office, there should also be a sailors' home.

Captain Hunter (Deputy Chairman of the London Local Marine Board) took exception to the statement of Captain Toynbee with respect to the scarcity of seamen. As far as he was aware there had been no scarcity of seamen in this country, except just after the period of the short strike that took place for higher wages. The fact was, at present there were more sailors than could get ships; and it was somewhat singular that, notwithstanding the alleged grievances as to bad provisions and bad berths, so many foreign sailors had joined our ships in preference to their own. It seemed to him as if the usage they got in our ships was better than that in their own. He thought it was a good thing that foreign sailors were induced to join our ships, because he preferred them to British seamen, not because they were better hands; but because, for the most part, they were more under control. The number of British seamen was greater now than at any former period. They manned the ships trading on the Australian coasts, as well as those in the East and West Indies. A great deal had been said about the deterioration of the race of seamen, but they could not expect to get as fine men from large cities as were drawn from rural populations. He saw no difference, however, as to the effectiveness of our seamen. The ships made as good passages, and generally came home in better condition than in former days. On the question of scurvy, he thought there was great confusion of ideas on the part of those in high quarters. By Act of Parliament it was provided that

limejuice and sugar should be supplied to the seamen after they had been kept on salted provisions for nine days, but it was well known that salt provisions had nothing to do with scurvy; it was the want of vegetable diet only. He had himself been out eleven months with only salt provisions and vegetables, without any scurvy on board. Since limejuice had been so prominently brought forward, captains had neglected vegetable diet, under the idea that limejuice alone was a preventive against scurvy; and often this latter was of a bad quality, and had no effect. With respect to the berthing of the crew in the forecastle, Captain Toynbee had recommended a manger to carry off the water shipped on deck. He hardly understood how that was to be done, and he thought the only plan was to keep out the water by stuffing up the hawse-holes. With respect to the crimps, he considered that was one of the worst features of the whole affair, and if means were taken to suppress their malpractices the utmost good would be done. As to medical examination of the men on shipping, he hardly thought that could be carried into practice. He cautioned the meeting against interfering too much with shipowners. Their business was an uncertain one, and of late had not been very profitable. They, like other people, wished to carry it on in their own way, but they had no objection to receive suggestions, and if they were wisely made most important benefits would result.

Dr. Leach (medical officer of the *Dreadnought*), having had considerable experience in scurvy cases, believed that a regular supply of good limejuice was a sure preventive. It was a well-known fact that in hundreds of ships that which was supplied as limejuice was either citric acid or sulphuric acid, or, in fact, not limejuice at all. He suggested that there should be a proper inspection of that article before a voyage was commenced, as he felt confident that if good limejuice were supplied to the ships the disease of scurvy would be almost eradicated from the merchant service.

Rev. Mr. Greatorex thought a sufficient case had been made out to call for legislative interference. It had been proved that scurvy was occasioned in a great measure by bad food, the blame of which, he considered, rested upon those who supplied the provisions, a matter in which the seaman himself had no control. As to the accommodation of the crews in the ships, he thought the legislature might step in, as that was a matter in which the seaman was also powerless. As an illustration of this, he mentioned that last spring a vessel which left London, on reaching Dover, was believed by the crew to be so unseaworthy that they refused to go any further in her. An inspector was sent for, who pronounced the ship to be seaworthy, on which the complaining parties were given into custody, and sentenced by a magistrate to six weeks' imprisonment; notwithstanding the vessel was ultimately obliged to put back into Plymouth for repairs. Legislation had provided for inspection in factories and other similar cases; why should it not be applied to the accommodation and treatment of seamen? With regard to the scale of provisions, he suggested that it should be posted up in the forecastle so that the men might know what they were entitled to, and be aware when their rights were infringed. He considered it was a great injustice that seamen should be put ashore in a foreign country on account of sickness from scurvy, mulcted of their wages, and left to get back as they could. He remembered the case of a seaman who was in a hospital at Madras for six months, and who came home invalided, without having received any pay for twelve months. In answer to his application to the Board of Trade, he was told that when the ship returned he could claim the wages due to him. But how could a man without money wait in that way for his pay? Legislation might enact that when a man left a ship for any good cause, he should be paid the wages due to him up to the time of his leaving. With regard to the evils to which seamen were exposed on shore—particularly in London and other great ports—he thought legislation would help to mitigate them. The moment a sailor stepped on shore he was met on all sides by those who would plunder him. It was quite certain if those questionable characters who hung about the docks were found loitering in Lombard-street they would be removed by the police, and he thought something might be done in that way in the neighbourhood of the docks. With reference to the formation of a fund for the benefit of seamen, he believed from his knowledge of them there was a general feeling in favour of it. They felt that the Government had not acted rightly in reference to the money which had been compulsorily contributed, and for which they got no return. Under those circumstances it might fairly be pressed upon the Government to do something to help seamen to form a fund on which they could fall back in their old age, instead of being thrown upon the workhouse. With regard to "homes" for married seamen, it was suggested that in the principal ports land should be given for the erection of such "homes." That suggestion, however, would not apply to London, from the enormously high price of land; but the case might be met by Government making up the difference between the price of land in the outskirts, and that in the localities where the "homes" were required. Without something of that kind such property could not be made to pay for the outlay; but if that were done, he believed ample accommodation would be provided for married seamen's families, at a cost which it was within their means to meet.

Mr. James Jackson said this was not the first occasion on which he had had the pleasure of hearing Captain Toynbee plead the cause of the British sailor, and though he could not agree with some of his propositions, he felt he was entitled to the thanks of all who took an interest in the great commercial marine of this country. Captain Toynbee had alluded to the petition to the Board of Trade from the Gateshead Chamber of Commerce. He (Mr. Jackson) thought, however, that that Chamber had to a great extent the remedy in their own hands, inasmuch as the great bulk of the shipping of that port was insured by a system of mutual insurance; and if, in self defence, they insisted upon a proper survey of the vessels being made, very few unseaworthy ships would be sent out. With regard to the alleged scarcity of seamen, and the circumstance mentioned in the paper in connection with Seaham, surely men who were the flower of the merchant service could have no difficulty in getting engaged by the large shipowners of London, who would only be too glad to have such men in their ships. With regard to the fund to which compulsory subscription had been made by seamen for so many years, he had no hesitation in saying he believed the general feeling amongst the mercantile marine was against Government interference in any pension fund for that service. They had been told that for upwards of a hundred years merchant seamen subscribed towards Greenwich Hospital, but they had never received a penny from that institution, while there was a noble building, the Belvedere, which, notwithstanding Captain Toynbee's somewhat depreciatory remarks, he ventured to say was making great progress. He believed there was a disposition on the part of seamen, especially in the outports, to support such institutions. This had especially been shown by the seamen of Sunderland. There had been many munificent donations and subscriptions to that institution, but after the commercial disasters of the last six months it was a bad time to make any special appeal to the public on its behalf. With regard to the fund accumulated from the unclaimed wages and effects of deceased seamen, he believed there was no indisposition on the part of Government to carry out the views of Mr. Henley, who, when President of the Board of Trade, stated that he regarded that fund only as in trust with the Government, and that when any properly established institution was provided to which

that fund would be applicable, it would be given up. He thought the prevalence of scurvy in the mercantile service had been exaggerated. Two of the largest provision merchants assured him that they had not had a complaint of scurvy having existed in any of the vessels which they provisioned for many years. But in the ports of Calcutta and Bombay it was not always that the best provisions could be purchased; and when they found that mistakes were made in the provisioning of a whole army, with the wealth of England at command, as was the case in the Crimea, some excuse was perhaps to be found for not always putting the best provisions on board ship. On behalf of the smaller shipowners, who were not generally represented at meetings like this, he would say he believed the men in the smaller class of merchant ships were better paid and better provided for than was generally the case in the larger class of ships. If it were the case that there was a scarcity of seamen, it was not to be wondered at, inasmuch as the apprenticeship system had been abolished; and owners, instead of training up youths for the service, preferred to carry fancy officers, in the shape of midshipmen, not one in six of whom ever made good practical commanders.

Capt. Tube (Secretary of the Belvedere Institution) said the gallant chairman would be glad to hear that, though there were at present only twenty inmates in that establishment, the youngest of them was 61, and three were over 80 years of age, and the institution was very highly appreciated by those who received its benefits. On one occasion he heard one of the aged men invoking the Divine blessing on those who had provided such an asylum for poor worn-out sailors. He thought such an institution had great claims upon the consideration of all classes of the community.

Mr. Harper (secretary to the Salvage Committee of Lloyd's) deprecated the views expressed by one of the speakers, who observed that Government should undertake to remedy these accumulated difficulties by legislation. Government protection had even been invoked so far as to suggest that it should interfere to protect the fair-dealing and honest shipowner, who was regarded as the victim of his own honesty, against the unfair-dealing shipowner who maltreated his seamen. He thought that was a monstrous proposition. He was surprised to hear a gentleman connected with shipping argue that all that had been stated about the condition of merchant seamen was mere fiction. In the discharge of his official duties at Lloyd's he came into contact with a vast number of merchant seamen, officers, and shipowners; and he thought there was no fact more incontestible than that the merchant seamen of this country were, as a class, in the most deplorable condition, physically and morally. There were, no doubt, exceptions, but as a rule the fact was as he had stated it. He thought this state of things was in a great measure to be attributed to the shipowners; but he could not agree that they ought to call upon the Government to interfere. He believed both shipowners and seamen were the victims of competition, which led the former to curtail his expenses as much as possible in order to maintain his business. This was a matter beyond the control of any Government; perhaps, however, with regard to forecastle accommodation and the quality of food, as those were matters in which the seaman could not help himself, there might be exceptional grounds for Government intervention; but on the other matters referred to, he thought it would be most unsafe to think of appealing to the legislature.

Mr. Pearsall, as a resident for twenty years in Hull, could state that the most liberal arrangements as to provisions, clothing, and accommodation, were made for the crews of the whaling vessels from that port; and every description of store was provided for a twelvemonth longer than the agreements with the men, in case of the vessels getting ice-bound. He suggested that old ships of war might be fitted up at a small expense for the reception of discharged seamen till they were paid their wages, a moderate sum being paid by them for the accommodation thus afforded.

Mr. Thomas Gray rose to suggest that the discussion of this important subject should be adjourned to a future meeting. He felt that justice could hardly otherwise be done to it. He should be grateful if an opportunity for its full discussion were afforded. It was a part of the subject which he had the honour of bringing before the Society last session, and as such he was anxious that it should be thoroughly considered.

Mr. Teulon said if Mr. Gray would prepare a short paper, by way of introduction, he had no doubt the Council would endeavour to fix an evening at some future time, when the subject might be resumed.

Mr. Mackay remarked that contradictory views had been expressed by different speakers as to the present condition of our merchant service. From the very good opinion entertained by Captain Hunter, to the sad experience of Mr. Harper on the other side, the right of the matter would perhaps be found midway between the two. For his own part he felt that a good deal of the evil complained of fell as a retribution upon shipowners for the way in which they had treated seamen in former days. There was no question that a great many forecastles were unfit for the housing of men. The American vessels always had a house on deck for their men, and proper space for seamen was always allowed in the ship's measurement. The four or five days that intervened between the ship's arrival in port and the payment of the men he considered was a dark spot in the system, and led to a multitude of evils, which might be avoided by money being paid on account before the sailors left the ship, so as to keep them out of the hands of the crimps. With regard to the condition of our seamen, we must bear in mind that the number of seamen in 1865 was 197,000, the deaths among whom were about 2 per cent., and those who retired from the service amounted to about 2 per cent. more. During the last seven years he found that the increased demand for seamen amounted to 1½ per cent., so that the annual requirements of our mercantile marine were about 10,000 men. He very much regretted that the apprenticeship system had been abandoned, for it seemed to him desirable that a proportion of the boys of the country should be annually trained for the sea—say 5,000 in the navy, and the same number in the mercantile marine. From that body draughts could be made for the merchant service, and they would have a stock of young sailors who by their training would be able to leaven the unwholesome mass which they had at present to deal with.

Mr. Reddie remarked that the evils of the delay between the seaman's discharge and the payment of his wages would be obviated by making it compulsory that they should be paid wages up to the day of payment, as was done in the Royal Navy; but he did not agree with the suggestion that old men-of-war ships should be converted into lodgings, and the proposal he had just made would obviate the necessity for such refuges. He sincerely hoped that the question of forming a committee on this subject would not be allowed to drop; and, looking at the intimate connection which existed between the Royal Navy and the mercantile marine, he hoped there would be placed upon that committee naval officers of experience who took an interest in the manning of the navy, for which the mercantile marine must be looked upon as the great reserve. With regard to the number of seamen, stated by Mr. Mackay at 197,000, he believed the total number of the mercantile marine was nearer 300,000, and Mr. Mackay could only have included the registered vessels in his calculation. It was therefore quite clear that no system of training-ships could furnish the necessary supply of seamen for this service. He did not agree with the suggestion that the month's advance to the men should be paid to a pension or insurance fund—[Captain Toynbee said this would be voluntary]—the object of the advance note being to

clear the sailor before he went to sea. There was one recommendation in the paper which he believed both shipowners and seamen would have a decided objection to—that was, posting in the forecastle the articles of agreement with regard to provisions, &c. It would never do to aid in that way in the manufacture of that abominable class called "sea-lawyers." Such a plan would create more grievances than it would remedy. With regard to dock clerks, the plan he recommended, of paying the men up to the day of settlement, would obviate in a great measure the necessity for them.

The Chairman, in closing the discussion, remarked that his experience, as a seaman in both branches of the service—the mercantile marine and the Royal navy—extended over a period of fifty-five years, and having himself to act as a medical man for upwards of fifty years, he believed he knew more of actual scurvy than probably any surgeon in the service. On starting for the coast of Africa, he did so with the determination if possible, not to lose a single man, and after serving there for three years and a-half he brought back every man alive. In the first year on the coast of Africa the whole of the crew, including the black men, were attacked with scurvy. The provisions were of the best quality, being duplicates of the stores supplied to Capt. Parry's Arctic ships, including essence of malt and hops, with which excellent beer could be brewed on board; and "Barclay and Perkins" was served out to the men every night. Both officers and men were attacked with scurvy, but the ship's surgeon knew nothing of the disease, having never seen it before. His (the Chairman's) own opinion was that the disease was produced by the men sitting on wet seats. He got rid of the Africans from his crew; returned home; shipped a fresh crew and went out again, taking care to carry out with him the means of giving the men dry seats. At night the crew was mustered in dry clothes; a pint of beer was served out to each man; and there was no case of sickness whatever during the next two years and a-half. He had always found that the officers seldom suffered from scurvy, and that in whalers the disease never made its appearance till the ships reached the fishing grounds. He had served in all parts of the world, and had never lost a man from scurvy contracted at sea. Two died of it, but then the scurvy was in their system before they left England. With regard to limejuice, he found it had no effect on the men, but all the cures were effected either by sulphuric acid or tartaric acid, when the men would not touch the limejuice. With regard to the funds arising from moneys paid by merchant seamen, it was laid down by the Commissioners of Patents that the money accumulated by patent fees was not considered to be the property of the Government, but was merely in trust; and he was satisfied the moment any institution was established to which the seamen's fund could be satisfactorily applied, it would, as stated by a former President of the Board of Trade, be refunded. On the question of bad provisions supplied to ships at some of the outports, he had positive knowledge that vessels had sailed from Liverpool and other ports with provisions of very inferior quality. It struck him that a very simple way of guaranteeing the quality of the provisions was to procure those which had the mark of the best provision dealers; and when a cask of bad meat was opened on board ship it should be at once condemned, and an entry made in the log-book. The mate and carpenter, with some of the leading seamen, should decide as to the quality of the provisions, in which matter he had always found that they were better judges than the officers. He fully concurred in the observations of Captain Toynbee with respect to sulphuretted hydrogen arising from the cargo hold. He had known instances in which every article of silver in the ship was blackened by that gas; and in the Indian ships no vessel that had carried sugar was ever allowed to carry tea. He thought it would be a beneficial arrangement that before a vessel took her clearance an official inspection should be made, with the view of ascertaining whether there was anything objectionable on board; and if objections or complaints were made by any of the crew, it was better to discharge them before sailing than to take mutinous elements out to sea. As regarded "homes" for married seamen, he did not see why a fund should not be accumulated for the purpose, to which married seamen should contribute, and a slight payment by each man would soon accomplish the object; these could be connected, if desirable, with the existing "homes." He was sure they all felt indebted to Captain Toynbee for his valuable and interesting paper, and he hoped its influence would not cease in this room. He hoped this subject would be taken up in a way that would give merchant owners and captains an opportunity of bringing the matter effectively before the Government; and he further hoped that Government would grant a commission, so that the whole question might be thoroughly inquired into. The Chairman concluded by proposing a cordial vote of thanks to Captain Toynbee for his paper.

The vote of thanks having been passed,

Captain Toynbee, in reply upon the discussion, said, in answer to Captain Hunter, that if seamen were in a satisfactory state, why did Mr. Graves, M.P. and shipowner, ask for a Royal Commission to inquire into the question, and why were sailors now showing an inclination to strike in all directions? With regard to foreigners, they might or might not be worse off in their own ships than British seamen, or they might be tempted by the better pay which enabled them to support themselves and families. This would perhaps explain the present large per-centage of foreigners. In reference to the question of scurvy, vegetables were not given to seamen at sea before limejuice was issued by Act of Parliament, and it was in consequence of scurvy that this Act was passed; now scurvy was returning because sulphuric acid and such like substitutes were given instead of limejuice. Captain Hunter's want of knowledge of the use of mangers only showed how much they were needed in the merchant service; they were required as well as the hawse-bags or canvas to which he had alluded. Mr. Jackson had pleaded for the shipowner, and said that if a sailor could not get a good ship in one port he should go to another. He had charged him (Captain Toynbee) with depreciating the Belvedere, but he had not intended to do so. On the contrary, he supported it warmly, and only wished others would do the same. Mr. Jackson had concluded by saying that there was mismanagement in the provisioning our army in the Crimea, from which he appeared to think we should not trouble ourselves about scurvy in the merchant service. Mr. Reddie, who, he believed, was Secretary of the Victoria Institute, had said that advance notes did good; this was contrary to experience. Monthly notes for wives and families did good, but advance notes induced sailors to waste the money of their last voyage, trusting to the advance note to fit them out for the next. Shipowners knew this thoroughly. He (Captain Toynbee) advised them to combine to stop this system, but, in order to show that it was not done for their own interest, to offer to pay the month's advance into the pension fund if the sailor wished it. He complained that telling sailors their rights made them "sea lawyers," but his (Captain Toynbee's) definition of a "sea lawyer" was a man who was constantly wishing and arguing for something which was not due to him. Nothing tended to form this character so much as not clearly defining what a man's rights were. Nothing checked it so thoroughly as telling a man distinctly his rights, giving him the opportunity to complain, but at the same time making him do his duty. The Chairman spoke of having had men suffering from an illness on the West Coast of Africa produced by long exposure in boats or wet seats, which he supposed to be scurvy, and had cured with sulphuric acid when limejuice was useless. He (Captain Toynbee) thought that this was some other disease, as to which the medical pro-

fession might well be inclined to ask further particulars. In conclusion, he might say that all he had asked for was the support of shipowners, and others interested in the welfare of our mercantile marine, in obtaining remedies for evils the existence of which was fully admitted. His suggestions did not involve large expense, and only interfered with that style of business which was carried on at a miserable saving, which was only obtained at the expense of the unfortunate seaman.

Admiral Ryder said he thought the best assistance this Society could afford would be by trying to induce Mr. Graves to renew his motion for a commission, which should have power to take evidence on oath. In this way some really reliable information might be arrived at, which no committee of this Society could possibly obtain. In his opinion this would be the most effective mode of action.

Proceedings of Institutions.

Macclesfield Useful Knowledge Society and School of Art.—The thirty-first anniversary of the Macclesfield Useful Knowledge Society, combining with it the annual meeting of the School of Art, was held on the 8th of November last; E. C. Egerton, Esq., M.P., one of the vice-presidents of the Society, in the chair. In front of the platform were exhibited a variety of drawings, the productions of the male and female students of the School of Art. A letter was read from the President, Mr. John Brocklehurst, M.P., regretting his inability to be present, but adding that as he hears that a great want of room, especially for the classes, is felt to be acting prejudicially to the interests of the institution, he has "much pleasure in placing a sum of £500 at the Committee's disposal, towards providing the requisite accommodation for the students, and removing what must otherwise prove a very serious drawback to the future prosperity of the institution." After an address by the Chairman, the Hon. Secretary, Mr. J. O. Nicholson, read the annual report for 1866, from which it appears that the list of members has suffered a very slight decrease; in 1865 it numbered 504, now 499; this number being composed as follows:—honorary 158, ordinary 226, females 50, and juniors 62. 193 students (81 senior, 62 junior, and 50 female) are now in attendance on the classes; the fees from this number if paid regularly would be £72 4s. per annum, whilst (without taking into account the due share of the other expenses of the Institute, such as rent, taxes, &c.) the salaries paid to teachers amount to £73 16s.; showing the charitable nature of the educational work performed by the society. According to lately collected statistics the pupils of the society number two-fifths of the whole receiving night-school education in the town. The classes are as follows:—Senior.—Arithmetic (average attendance) 29; reading, writing, and dictation, 29; grammar, 13; history and geography, 20; French, 10; phonography, 13; lecture class, 77. Female.—General instruction, 23: sewing, 13. Junior.—General instruction, 49. The students during the past year have been submitted to examinations instituted by the Lancashire and Cheshire Union of Institutes; the Society of Arts; the Department of Science and Art; and the Local Committee. The results were very favourable. The science classes of last Session had not the successful termination which the committee desired to see. This was owing to the removal from the town of the teacher before the conclusion of the series of lectures, and the consequent almost non-attendance of the pupils at the Science Examination. A series of lectures upon scientific subjects was in course of delivery by Mr. Greg. The lectures have been confined to ordinary members, and the average attendance has been 77. The phonographic class has made much progress during the year, several of the pupils being able to write at the rate of 70 words a minute. It has been computed that since the establishment of the female class in 1852, 900 pupils have there received instruction. Monthly readings of an interesting character have been given to this class. During the year there has been an issue of 9,760 volumes from the society's library, 2,317 from Mudie's, and 1,190 from the London Library Company, a total of 13,267. The supply from Mudie's is nearly 80 volumes, exchanged about every two months; that from the London Company 100 volumes, exchanged quarterly. The library now possesses more than 5,000 volumes; it has only had added to it 32 volumes during the year. The appeal made last year to the members on behalf of a fund for securing telegraphic information resulted in promises of subscriptions amounting to £10. The committee then decided to incur the extra expense, but upon application to the Electric Telegraph Company were informed that they were not in a position to forward telegrams of such a character and extent to Macclesfield. During the year two lectures and an entertainment have been given on the society's behalf, Mr. Councillor David Morris, F.S.A., lectured upon "Lancashire Poets and Poetry;" J. D. Sainter, Esq., gave a lecture upon the Natural History, &c., of Danes Moss, near Macclesfield; and a musical and dramatic entertainment was sustained by Captain Lathbury and Messrs. Smith and Gregory. A new catalogue of the library has been prepared. In February last Mr. David Chadwick placed at the disposal of the committee fifty guineas for prizes for essays, the essayists to be, or to have been, inhabitants of Macclesfield, and the subjects to be—1st, "Macclesfield Past;" 2nd, "Macclesfield Present and Future." Two prizes to be awarded in each subject; 1st prize, 20 guineas; 2nd prize, 5 guineas. Samuel Greg, Esq., John May, Esq., and Dr. Watts acted as referees. Six competitors sent in Essays, and the prizes were awarded as follows:—"Macclesfield Past."—1st prize, 20 guineas, to John Wootton; 2nd prize, 5 guineas, to J. O. Nicholson. "Macclesfield Present and Future."—1st prize, 20 guineas, to J. S. Barrett; 2nd prize, 5 guineas, to J. O. Nicholson. Through the further liberality of Mr. Chadwick, the sum of six guineas was distributed among the three unsuccessful competitors. The financial statement of the year is as follows:—Receipts, £350 9s. 7d.; disbursements, £494 3s.; balance due to treasurer, £143 13s. 5d.—The Rev. W. R. B. Arthy moved the first resolution to the effect that the report be adopted; and also recognising the fact that a valuable primary education is being given to nearly 200 scholars at this Institute for the nominal fees of 2d. per week for males, and 1½d. per week for females. Mr. Greg seconded the resolution, which was passed. The Hon. Secretary then read the annual report of the School of Art, in which the writer gives his opinion as to the effect on art instruction of the recent change of system pursued in all schools, introduced by the Department of Science and Art, on the recommendation of the Select Committee of the House of Commons, which sat in 1864. Four points of comparison (says the reporter) between the present and past systems will suffice to sum up the most important features, and which may be briefly contrasted thus:—*Past Systems.*—1st. Government assistance to schools by fixed salaries to masters, as in my predecessor's case—or by payment on certificates, as in my case—and in both cases additional payment on results of examination of artizan students and artizans' drawings.—2nd. Compulsory connection of schools of art with parochial schools, and division of payment on results of drawing examinations in parochial schools.—3rd. Prescribed competitive works.—4th. Addition of books and art works to property of art schools on success of students' drawings. The Macclesfield School having obtained art property of the value of £321 10s. since its commencement. *Present System.*—1st. Abolition of fixed salaries and certificate money, and substitution of increased payment on results.—2nd. Severance of parochial schools, and consequent entire payment to their

committees. During last year, the first since the severance, their was a total decrease of 5,000 receiving instruction in drawing in parochial schools throughout the United Kingdom.—3rd. Freedom of selection of competitive examples.—4th. Discontinuance of all awards of property to schools of art. It will be seen from these few facts (says the reporter) that Government support to schools of art has decreased on every hand; and that the change of system has been most prejudicial to the numbers taught drawing in parochial schools; but, by the abolition of restricted examples, masters will be able to devote more attention to local trades than hitherto. The grand total taught in and through the agency of this school since its commencement in 1851 to Sept. 1866, has been 8,000, divided as follows—Central school:—Ladies' morning class, 80; general evening class, 718; private schools, 304; and parochial schools, 6,898. During this period 26 national medallions or Queen's prizes, 134 medals, and 149 second or highest grade prizes were gained by the students of the morning and evening classes, and 623 first or lowest grade prizes, by pupils of the parochial schools. The medallions and medals gaining £321 10s. worth of books and art examples, the property of the school, making altogether more than £1,500 worth of art works in the school for the study of this town. The number of students who received instruction in the school during the year which terminated on 30th September, 1866, is as follows:—Ladies' morning classes, 20; general evening classes, 78; total, 98. In addition, 614 pupils were instructed in private and other schools, making the total number of all classes who received instruction in and through the agency of this school, 712. At the annual examination held in March, 1866, 166 pupils were successful, passing in such subjects as free-hand drawing, geometry, perspective, and model drawing—gaining colour boxes, drawing boards, T squares, certificates, and cards. Also eleven drawings were sent to London by the students of this school, in competition with other schools, and the whole were successful, obtaining medals, books, &c. In conclusion the reporter states that nine young men—who received their early art education in this school—have obtained excellent situations; five gaining admission to the National Art Training School, London, and receiving salaries, two of whom have become masters of schools of art, two ornamental glass designers, and one at present in training. Also two as silk designers, one as architect, and one as sculptor.—Mr. Henry Brocklehurst moved the adoption of the report, which was seconded by Mr. W. Bullock, and carried. The meeting concluded with the usual votes of thanks.

PARIS EXHIBITION, 1867.

Her Majesty's Commissioners, with the Associate Commissioners, held meetings on Friday, the 11th inst., at the South Kensington Museum. His Royal Highness the Prince of Wales presided over both meetings. There were also present the following:—

His Royal Highness the Duke of Edinburgh, K.G., the Duke of Buckingham and Chandos, the Duke of Sutherland, K.G., the Duke of Cleveland, K.G., the Earl of Clarendon, K.G., the Earl De Grey and Ripon, Earl Granville, K.G., Lord Henry Lennox, Lord Talbot de Malhahide, Lord Houghton, Right Hon. Sir J. S. Pakington, Right Hon. T. M. Gibson, M.P., Right Hon. C. B. Adderley, M.P., Right Hon. G. J. Göschen, M.P., Right Hon. H. T. L. Corry, M.P., Sir A. Y. Spearman, Sir S. M. Peto, Sir R. I. Murchison, K.C.B., Sir F. R. Sandford, Sir Francis Grant, P.R.A., Mr. Edgar Bowring, C.B., the Right Hon. the Lord Mayor, Mr. Thomas Baring, M.P., Mr. Thomas Bazley, M.P., Mr. G. T. Clark, Mr. Charles Duffin, Mr. Thomas Fairbairn, Mr. Charles Forster, M.P., Mr. T. F. Gibson, Mr. William Hawes, Mr. Lewis Heymann, Mr. M. D. Hollins, Mr. A. J. B. Beresford Hope, M.P., Mr. Charles Lawson, Mr. P. W. S. Miles, Mr. R. Redgrave, R.A., Lieutenant-General Sabine, R.A., Mr. W. Scholefield, M.P., Mr. W. Warington Smyth, Mr. Frederick Taylor, Mr. Henry Thring, Mr. Henry Warren, Lord G. Fitzgerald, Hon. Ashley Ponsonby, Viscount Torrington, the Earl of Warwick, the Earl of Cadogan, Hon. R. Curzon, Hon. Seymour Egerton, M'Leod of M'Leod, Archbishop Manning, Lord R. Montagu, the Very Rev. Dr. Rock, the Duke of St. Albans, Sir Harry Verney, the Duke of Wellington, K.G., Hon. Reginald S. West, Lord Wharncliffe, Sir Watkin W. Wynn, Bart., the Earl of Cork, Mr. H. E. Acton, Mr. Patrick Adie, Mr. J. V. Appell, Mr. C. Asprey, Mr. A. Barker, Mr. J. Barnes, Mr. C. Barnett, Rev. J. Beck, Mr. Thomas Begges, Captain Belfield, R.E., Mr. T. Bell, Professor Sterndale Bennett, Professor Bentley, Rev. M. J. Berkeley, Mr. James Betts, Mr. Samuel Bevington, Mr. Daniel Biddle, Mr. W. Bird, Mr. C. C. Black, Mr. S. H. Blackwell, Mr. G. E. Blenkins, Mr. H. A. Bowler, Colonel Boxer, R.A., Mr. J. Brinton, Rev. W. H. Brookfield, Mr. George Brown, Mr. J. Buchanan, Mr. F. T. Buckland, Mr. W. Bull, Mr. W. W. Buller, Mr. A. Burnand, Rear-Admiral Caffin, Mr. James Caird, Mr. T. W. Callow, Mr. Alderman Carter, Mr. G. J. Cayley, Mr. E. Chadwick, C.B., Dr. T. K. Chambers, Mr. R. L. Chance, Mr. Harry Chester, Mr. S. Child, Mr. W. H. Clabburn, Captain M. C. Close, Mr. George Clowes, Captain Cockerell, Admiral Collinson, Lieutenant-Colonel Cooke, Mr. T. Cooke, Alderman Copeland, Mr. E. Corbiere, Mr. F. Cosens, Mr. M. Costa, Mr. L. Cottam, Rev. B. M. Cowie, Mr. J. R. Cox, Mr. J. G. Crace, Mr. W. H. Cremer, Mr. Eyre Crowe, Rev. Dr. Cumming, Mr. T. Chesman, Mr. F. N. Dancer, Mr. G. W. Dasent, Mr. Warren De La Rue, Mr. J. Bailey Denton, Dr. Hugh W. Diamond, Colonel Dixon, R.A., Mr. Henry Dixon, Professor Donaldson, Captain Donnelly, R.E., Mr. G. F. Duncombe, Mr. Henry Eaton, M.P., Mr. Benjamin Edgington, Colonel Ewart, R.E., Mr. J. Farmer, Dr. A. Farre, M.D., Mr. Robert Fauntleroy, Mr. S. Fisher, Mr. G. E. Forrest, Mr. P. Le Neve Foster, Dr. Frankland, Mr. A. W. Franks, Mr. C. J. Freake, Mr. G. H. Frean, Captain Douglas Galton, R.E., Mr. Ernest Gambart, Mr. C. Gatliffe, Mr. J. Gibson, Mr. George Godwin, Mr. Peter Graham, Lieutenant-Colonel Grant, R.E., Mr. W. Grapel, Mr. Henry Gray, Mr. Thomas Gray, Mr. Henry Greaves, Mr. Henry Gregory, Mr. C. F. Hancock, Mr. R. Haswell, Rev. Edward Hawkins, D.D., Mr. J. Head, Major-General Hay, Mr. W. C. Henley, Mr. F. Hicks, Mr. S. H. Hicks, Captain Hichens, R.E., Mr. M. J. Higgins, Mr. F. Hill, Sir Rowland Hill, K.C.B., Mr. Frederick Hodges, Dr. A. W. Hofmann, Mr. W. Holland, Mr. H. M. Holmes, Major-General the Hon. A. N. Hood, Dr. Hogg, Dr. J. D. Hooker, Mr. G. W. Hooper, Mr. G. Houghton, Mr. S. M. Hubert, Lieutenant-Colonel Hudson, Mr. J. Hunt, Rev. W. Jackson, Colonel W. F. D. Jervois, Mr. E. C. Johnson, Mr. E. D. Johnson, Mr. Owen Jones, Mr. H. Keeling, Mr. J. Kelk, Mr. A. C. King, Mr. L. King, Mr. H. L. Lapworth, Mr. John Latham, Mr. William Leaf, Mr. J. Lee, Mr. R. Leeds, Brigadier-General Lefroy, Rev. F. K. Leighton, Lieutenant-Colonel Lennox, R.E., Dr. Letheby, Mr. W. Leuchars, Mr. S. Lewis, Mr. George Loch, Q.C., Mr. J. Locke, M.P., Mr. Benjamin J. Long, Mr. C. Lucas, Mr. J. Luke, Mr. J. MacGregor, Mr. Alexander M'Intosh, Mr. T. F. Marsh, Mr. J. Marshall, Captain Martindale, Mr. W. Matchwick, Mr. W. Maskell, Dr. M. Masters, Mr. C. B. Matthews, Lieutenant-Colonel Maude, R.A., C.B., Mr. H. Maudslay, Mr. J. J. Mechi, Mr. G. Menzies, Mr. W. Menzies, the Master of the Mercers' Company, the Master of the Merchant Taylors' Company, Professor Miller, Mr. C. W. Merrifield, Rev. M. Mitchell, Mr. G. Moffatt, M.P., Mr. F. W. Moody, Mr. Thomas Moore, Rev. Canon Moseley, Mr. F. Mulliner, Mr. A. Murray, Mr. A. N. Myers, Mr. Donald Nicoll, Mr. Henry Ormson, Mr. William Osborne, Mr. J. A. Owen, Professor Owen, Mr. Percival ..eile, Mr. George Palmer, Mr. J.

Peel, Mr. J. Pinder, Mr. J. Penn, Mr. H. Cholmondeley Pennell, Mr. J. Peters, Captain Phillimore, Mr. W. H. Phillips, Mr. C. A. Pierce, M. J. H. Pollen, Mr. H. G. Poole, Mr. Norbury Pott, Mr. F. S. Powell, M.P., Mr. Nathaniel Powell, Mr. W. Priestly, Mr. A. Puckridge, Dr. Quain, Dr. Quin, Mr. G. Ramsey, Mr. Samuel Redgrave, Mr. G. Redmayne, Mr. T. J. Reed, Mr. James Reiss, Mr. T. Reeks, Mr. Westley Richards, Mr. Eugene Rimmel, Mr. J. H. Ritchie, Mr. J. C. Robinson, Rev. W. Rogers, Rear-Admiral Ryde, R.N., Major-General St. George, R.A., C.B., Mr. Alderman Salomons, Mr. Titus Salt, Mr. S. J. Salter, Mr. J. D. A. Samuda, M.P., Mr. W. Sangster, Mr. E. Sayer, Commander Scott, R.N., Sir J. P. K. Shuttleworth, Bart., Mr. S. W. Silver, Mr. W. B. Simpson, Mr. R. H. Smith, Dr. E. Smith, Mr. J. J. Smith, Mr. W. Baxter Smith, Mr. W. H. Smith, Mr. T. Sopwith, Mr. W. R. Spicer, Mr. H. Stuart, Mr. G. R. Stephenson, Mr. M. H. Sutton, Mr. S. Sidney, Mr. J. Taplin, Mr. Thomas Taylor, Professor Wyvil Thompson, Mr. A. J. R. Trendell, Colonel Sir Thomas Troubridge, C.B., Mr. C. Turner, Mr. F. Turner, Mr. R. S. Turner, Professor Tyndall, Mr. J. Unite, Mr. G. F. Urling, Mr. H. Vaughan, Mr. J. Veitch, Professor Voelcker, Dr. E. J. Waring, Captain Warlow, R.A., Mr. Alderman Waterlow, Mr. Anthony Waterer, Mr. J. Watts, Major-General Sir A. Scott Waugh, R.E., Mr. H. P. Way, Mr. J. Weeks, Mr. H. Weir, Mr. F. West, Professor Wheatstone, Mr. T. M. Whitehead, Mr. J. Whitwell, Mr. G. F. Wilson, Dr. Woolley, Mr. J. Whitworth, Mr. C. Woollerton, Mr. M. Digby Wyatt, and Mr. C. Wylde.

Mr. Henry Cole, C.B., the secretary to her Majesty's Commissioners, attended.

His Royal Highness the Prince of Wales read the following memorandum on the prospects of the Exhibition:—

"1. Her Majesty's Commissioners thank the Associate Commissioners for the suggestions they have made in recommending jurors. They also thank the several committees of the Associate Commissioners who have frequently met in order to insure a proper representation of objects of ancient art, modern pictures, engravings, various manufactures, printing, navigation, munitions of war, &c.

"2. Her Majesty's Commissioners thank the Trustees of the British Museum, as well as those of other public institutions, for the readiness with which they have consented to lend objects necessary for completing the Exhibition at Paris.

"3. It has not been found necessary to ask for the services of the Associate Commissioners in several classes, because the demands for space in those classes have greatly exceeded the amount that could be granted; and in respect of the classes for agricultural stock, action has been suspended by the Imperial Commission in consequence of the cattle plague.

"4. A statement of the representation which each class appears likely to make in the Exhibition will be laid before the Associate Commissioners, and her Majesty's Commissioners will be glad to receive their assistance in supplying some few deficiencies.

"5. Her Majesty's Commissioners regret that the staple industry of cutlery, for which England is remarkable, should at present appear to be most imperfectly represented; it may be hoped that by the co-operation of the Associate Commissioners and the Master Cutler of Sheffield an adequate representation of that important branch of industry may be effected.

"6. Notwithstanding this deficiency, her Majesty's Commissioners have the gratification of believing that in other respects, the United Kingdom, India, and the colonies will be far more completely represented than in any previous International Exhibition.

"7. A new and very important inquiry—namely, the effect on workmen of co-operation and benevolent associations throughout Europe—has been originated by the offer of prizes by the Imperial Commission.* To each Associate Commissioner has been sent a copy of the series of questions which it is desirable should be answered by persons or establishments in this country, and the Associate Commissioners will much promote this inquiry if they will assist in causing these questions to be filled up as extensively and as soon as possible.

"8. It is the earnest wish of Her Majesty's Commissioners that the example set by the French in 1862 of assisting foremen of works and artisans to study the Exhibition should be followed, and that the utmost facilities should be afforded to British workmen to visit and study the Paris Exhibition. Her Majesty's Commissioners express a hope that the Associate Commissioners will, in concert with the Society of Arts, municipal authorities, and Chambers of Commerce throughout the country, be able to assist materially in promoting such visits.

"9. The Executive Department of the British section has provided offices for the transaction of business at 71, Avenue des Champs Elysées, Paris, where the Associate Commissioners will be able to obtain information respecting the Exhibition, and facilities for visiting it."

The following were the subjects discussed at the meeting of the Commissioners:—

The list of proposals for jurors, and the measures necessary for nominating them, also the appointment of associate jurors and delegates, for which purpose a committee, representing the various groups, was appointed to select the jurors.

The Commissioners next considered a memorandum on the prospects of the Exhibition, which his Royal Highness the President read to them, and adopted it after a discussion on the paragraph relating to the new order of reward, in which the Lord President of the Council, Earl Granville, the Duke of Cleveland, the Earl of Clarendon, Lord Houghton, Mr. Bazley, M.P., Mr. Beresford Hope, M.P., and Mr. Clark, of Merthyr Tydvill, took part.

A letter from the Society of Arts was read on the steps necessary to be taken to promote the study of the Exhibition and industrial establishments in France by artisans.

After reading a correspondence with the India-office on the representation of Indian architecture, it was resolved to appoint a committee of advice on this subject.

His Royal Highness the Duke of Cambridge, the Secretary of State for War, the First Lord of the Admiralty, and Mr. Robert Napier, late President of the Society of Mechanical Engineers, were elected Commissioners.

The Commissioners then proceeded to meet the Associate Commissioners, when his Royal Highness the President read the above announcement agreed upon by her Majesty's Commissioners.

The following report on the approximate number of exhibitors, and the articles not represented, or insufficiently represented in each class, was also laid before the Associate Commissioners:—

"Where specified objects are named (as cameos in Class 8, globes in Class 13) there is at present no evidence that they will be adequately represented in the Exhibition, and where there are no numbers of exhibitors specified there are no exhibitors.

"CLASS 6. Typography.—39 exhibitors.

"7. Paper.—48 exhibitors.

"8. Drawing and modelling in common arts.—23 exhibitors. Cameos.

"9. Photography.—102 exhibitors.

"10. Music.—24 exhibitors.

"11. Musical instruments, &c.—29 exhibitors.

* The words of the Imperial Commission are as follows:—A distinct order of reward "instituted in favour of persons, establishments, or localities, which by a special organisation or special institutions have developed a spirit of harmony among all those co-operating in the same work, and have provided for the material, moral, and intellectual well-being of the workmen."

"12. Mathematical instruments.—27 exhibitors. Measures and weights of the various countries.

"13. Maps, &c.—6 exhibitors. Terrestrial and celestial globes and spheres.

"14. Fancy furniture.—42 exhibitors.

"15. Upholstery.—29 exhibitors.

"16 Glass.—27 exhibitors.

"17. Porcelain, &c.—13 exhibitors. Biscuit. Terra cotta.

"18. Carpets.—23 exhibitors. Furniture stuffs of cotton, wool, or silk, plain or figured.

"19. Paper hangings.—10 exhibitors. Blinds, painted or printed.

"20. Cutlery.—7 exhibitors. (Poorly represented.)

"21 and 36. Plate and jewelry.—31 exhibitors.

"22. Bronze castings, &c.—2 exhibitors. (Poorly represented.)

"23. Clocks, &c.—32 exhibitors.

"24. Heating, &c., apparatus.

"25. Perfumery.—15 exhibitors.

"26. Leather fancy goods.—39 exhibitors.

"27. Cotton.—29 exhibitors.

"28. Flax and hemp.—17 exhibitors.

"29. Wool, combed.—9 exhibitors.

"30. Wool, carded.—107 exhibitors.

"31. Silk.—30 exhibitors.

"32. Shawls.—4 exhibitors. (Poorly represented.)

"33. Lace, &c.—31 exhibitors.

"34. Hosiery.—14 exhibitors. Baby linen, fans, screens.

"35. Clothing.—42 exhibitors. Clothing peculiar to various professions and trades.

"36. Jewelry.—See 21 class.

"37. Portable weapons.—16 exhibitors. (Exceptional case.)

"38. Travelling apparatus, and camp equipage.—12 exhibitors. Portable apparatus specially intended for scientific voyages and expeditions, photographic apparatus, instruments for astronomical and meteorological observations, equipment and implements for geologists, mineralogists, &c.

"39. Toys.—6 exhibitors. For toys and games (except cricket) but one exhibitor.

"40. Mining.—123 exhibitors.

"41. Products obtained from forests.—7 exhibitors. (Imperfectly represented.)

"42. Products of fishing and uncultivated fruits.—1 exhibitor. (Only gums and turpentines represented.)

"43. Agricultural products (not food.)—11 exhibitors. Cocoons of the silkworm, tobacco, German tinder, tanning and dyeing substances. (Poorly represented.)

"44. Chemical products.—96 exhibitors.

"45. Chemical processes. Dyeing, &c.—4 exhibitors. (Poorly represented.)

"46. Leather.—22 exhibitors. Parchment, gutwork, strings for musical instruments.

"47. Apparatus in mining.—16 exhibitors. Models and plans of workings in mines and quarries, mining ladders, drainage machines, apparatus for saving life, parachutes, signals, apparatus for carbonization of fuel, smelting furnaces, smoke consumers, metal work apparatus, apparatus for forges, &c.

"48 and 74. Apparatus in cultivation.—58 exhibitors. Plans and models of farm buildings, plans of systems of re-planting and cultivating forests, and apparatus used for cultivating the same.

"49. Apparatus for fishing, and uncultivated products.—6 exhibitors. Guns and shooting apparatus and equipment, apparatus and implements used in gathering products obtained without cultivation.

"50. Apparatus for agricultural works.—31 exhibitors. Apparatus used in manufacture of artificial manures.

"51. Apparatus for chemistry.—10 exhibitors. Apparatus used in assays, in the manufacture of chemicals, soaps, candles, essences, varnishes, and articles in india-rubber, &c., bleaching pharmaceutical products, glass works, and ceramic manufactures.

"52. Engines, &c.—24 exhibitors. Shafts, rails, and turn-tables.

"53. Machines.—45 exhibitors. Machines set in motion by evaporation of ether, ditto by gas, &c., windmills, panemones, air balloons.

"54. Machine tools.—22 exhibitors.

"55. Apparatus for spinning.—16 exhibitors. Materials used in rope manufacture, round, flat, tapering cables, cord and twine wire rope, &c.

"56. Apparatus for weaving.—16 exhibitors. Apparatus used for making lace.

"57. Apparatus for sewing.—13 exhibitors.

"58. Apparatus for making furniture.—1 exhibitor. (Almost entirely unrepresented.)

"Apparatus for paper-making, &c.—9 exhibitors. Apparatus for bleaching and dyeing, materials, apparatus and products of type-founding, machines and apparatus used in typography, &c., printing postage-stamps, machines for setting up and sorting type.

"60. Small machines.—4 exhibitors. Coining presses, tools for and processes of making clockwork, toys, &c.

"61. Carriages.—45 exhibitors. Waggons, tumbrels, drays, and vehicles for special purposes, sledges, velocipedes.

"62. Harness.—21 exhibitors.

"63. Railway apparatus.—18 exhibitors.

"64. Telegraphy.—4 exhibitors. (Barely represented.)

"65. Engineering.

"66. Navigation and lifeboats.

"67. Cereals, &c., for food.—6 exhibitors. Fecula from potatoes, rice, lentils, &c. Gluten, tapioca, Italian pastes, &c., alimentary preparations as substitutes for bread, &c.

"68. Bread and pastry.—3 exhibitors. (Only represented by biscuits.)

"69. Fatty food.

"70. Meat and fish.—8 exhibitors. (Barely represented.)

"71. Vegetables and fruit.—1 exhibitor. Fresh fruit.

"72. Condiments.—20 exhibitors.

"73. Drinks.—16 exhibitors.

"74 with 48.—Farm buildings.

"75. Horses.—4 exhibitors. Animals as specimens of breed of country.

"76. Bulls, &c.

"77. Sheep, &c.

"78. Pigs.

"79. Poultry.

"80. Dogs.

"81. Insects.—4 exhibitors. (Represented.)

"82. Fish.

"83. Hothouses, &c.

"84. Flowers.

"85. Vegetables.

"86. Fruit trees.

"87. Seeds.

"88. Hothouse plant.

"89. Instruction to children.—34 exhibitors.

"90. Libraries, &c.—1 exhibitor. (Only represented by reading books for adult schools.)

"91. Cheap furniture.—7 exhibitors. (Represented.)

"92. Clothing of countries.

"93. Cheap dwellings.

"94. Skilled workers' work.

"95. Skilled workmen's instruments."

METROPOLITAN AND PROVINCIAL WORKING CLASSES' INDUSTRIAL EXHIBITION.

The ceremony of presenting the prizes to the successful competitors at this exhibition, which was held in the Agricultural Hall, Islington, in the months of September and October last, was performed on Saturday afternoon, the 12th instant, in the large room of Exeter-hall.

The Right Hon. Mr. J. G. Göschen, M.P., took the chair. From the report of the Council, which had been printed for circulation amongst the exhibitors, it ap-

peared that during the ten weeks the exhibition was open 599,248 persons entered the building, of whom 530,797 paid for admission. The number of persons who entered the building during the first week was nearly 55,000, which increased to 84,000 in the second week. During the third week, owing to the inclement weather, the number declined to 74,000; but in the week following it rose to nearly 89,000, the highest number in one day being 25,240 (Sept. 24). From this point the attendance gradually declined, although on no occasion were there less than 3,000 visitors in a day. The total amount of money paid for admission at the doors was £4,664 7s. 10d.; from sale of tickets, £60 17s.; reserved seats, £177 5s. 6d.; sale of catalogues and programmes, £216 2s. 7d.; receipts from other sources, including rent of stalls, £300; making a total of £5,400. Of the expenditure the rent absorbed £1,066; gas, £662; wages, £886; printing, £473; advertising, £120; bill-posting, £110; decoration and fitting-up, £373; machinery, £100; police, £90; music, £250; other expenses, £400.—Total, £4,530, leaving a balance in favour of the executive, for disposal, of £870. The gross number of exhibitors was 1,492, and the awards of prizes by the adjudicators consisted of 85 silver medals, 187 bronze medals, and 189 certificates of honourable mention, making a total of 461. In addition to these, there were a number of special prizes amounting in value to £57.

The Chairman, after delivering an address, distributed the prizes. The first special prize, £10, the gift of the Agricultural Hall Company, was presented to H. A. Major, a letter-carrier, for the best painting in oil. The prize of £15, offered by the same company for the most useful invention, was divided among three competitors, who had exhibited respectively a decimal key, a model of railway signals, and a boat-lowering apparatus. A silver cup, given by Messrs. Howard, of Bedford, was won by A. M. Franklin, of that place, who exhibited a model plough. Miss Alice Hazelden, aged 17, was presented with £5, the gift of Mr. J. Harris, for the best water-colour drawing. Mr. W. A. Latta, a compositor, received a prize of £2 2s., the gift of Mr. J. E. Wilson, for the best specimen of ornamental typography. Miss Ellen M. Hammond, governess, was presented with a prize of two guineas for the best specimen of fancy needlework. After the special prizes, the silver medals, 85 in number, were presented; next the bronze ones, of which there were 187; and then the certificates of honourable mention, 189 in number. The distribution of the pictures of the exhibition followed.

Mr. Beresford Hope then spoke for some time on the subject of the art bearing and relations to art of these exhibitions.

On the motion of the Rev. Henry Solly, seconded by Mr. Holmes, a cordial vote of thanks was awarded to the Chairman, and duly acknowledged.

CULTIVATION OF COTTON IN THE BOMBAY PRESIDENCY.

Mr. W. Walton, in charge of the office of Cotton Commissioner, has recently submitted to the Bombay government the annual report on the distribution of cotton seed by this department for the sowing season of the year 1866. Accompanying the report was a statement showing in complete detail the quantities and descriptions of seed that have been issued, and the places to which it has been sent. The list shows also 30 recipients of seed against 32 of the preceding year. Mr. Walton remarks that it will be observed, however, that in 1865 only "Dharwar acclimatised New Orleans seed" was supplied, whilst in the year under review cotton seed of no less than nine descriptions—exotic, indigenous, and acclimatised—were issued to requisitionists from almost all parts of India.

From the report it appears that upwards of seven and a-half tons of New Orleans seed have been distributed; the supply, however, by no means gives any idea of the demand. "If I could have got it in time," says the Commissioner, "I could have issued upwards of two hundred tons: the demand was unprecedently large, but unfortunately the Cotton Supply Association could only send out the limited supply that has been issued. The greater part of the seed distributed has been issued in the Dharwar districts, where the cultivation of New Orleans cotton has taken so firm a hold as to have become one of the most important of the regular products of the country. Unfortunately, the seed of this class of cotton grown in the zillah has now got a considerable admixture of indigenous cotton seed; the large distribution of fresh American seed that has taken place this year, together with the careful and comprehensive arrangements that were made for sowing pure acclimatised seed, will, it is confidently expected, make a marked improvement in the season's crop." From a correspondence between the Commissioner and Dr. Henderson, the secretary of the Agri-Horticultural Society at Lahore, it appears that New Orleans cotton has been grown in the Punjaub for many years. Dr. Henderson observes:—"Four years ago I brought to notice a fact not generally known, and which is still hardly believed here, viz., that New Orleans cotton has been grown in the Punjaub, in the district of Shapoor, for fifty years at least, and is as good as any I have seen from imported seed. Three years ago I offered to supply it in any quantity, but the Financial Commissioner had then ordered a supply of imported seed. The zemindars only grow this cotton for home use, as they get the same price for good as for bad cotton." It would seem to be worth inquiring whether this cotton has deteriorated much or not, as, if it at all approaches the quality of Dharwar acclimatised New Orleans cotton, it will be infinitely more profitable to the people of the Punjaub to cultivate and send it to Kurrachee for shipment, instead of the comparatively worthless stuff that now annually comes down the Indus in such large quantities. Dr. Henderson's last observation seems to call for remark. It must be a strange state of trade which gives the same price for bad as for good staple. If there are zemindars in the Punjaub willing to raise superior cotton, there are doubtless merchants in Kurrachee, if not in the Punjaub, perfectly ready to give the enhanced price that their produce should get for its superiority over the indigenous cotton of the country. The importance of the matter has received the attention of the Punjaub government. They took up the subject in the previous year, and distributed nearly 200 maunds of Dharwar acclimatised New Orleans seed.

Of Dharwar New Orleans seed upwards of twenty and a-half tons have been distributed during the season under review, against over thirty-nine tons in the preceding year. This fall-off is mainly accounted for by the fact that in 1865 the North-West Provinces and the Nuggur division of Mysore got the very large supplies of 1,002 and 1,618 maunds respectively. The produce from such large supplies would, it might have been expected, have been sufficient to meet any demand that could arise in those districts for this description of seed. Such, however, is not the case. Dharwar American cotton has apparently been so successful in the North-West Provinces that a further supply of 20 tons was called for this year. This supply was carefully selected from the very best Dharwar seed, and the Commissioner trusts that the result will be that New Orleans cotton will permanently become a profitable and successful product of the North-West Provinces. The seed distributed in the Nuggur division of Mysore has been successful, and the produce bears comparison with the best Dharwar New Orleans cotton. The Nuggur division of Mysore adjoins the Dharwar zillah, and the introduction of the seed was all that was required. The cultivation has been largely established, and the Nuggur ryots now get large supplies of fresh seed from their neighbours of the Dharwar districts. In the Dharwar zillah ample arrangements have been made for sowing pure seed.

Of Peruvian exotic cotton eight cwts. have been distributed, the principal part of which goes to the Khandeish zillah and the Punch Mahals.

Very little of the Dharwar acclimatised Peruvian (only 8¾ lbs.) has been distributed. Mr. Walton regrets this, as he states that he has personally tried exotic Peruvian cotton and the Dharwar acclimatised Peruvian seed, and the result is such as not to allow of a comparison. The plants that have germinated from the acclimatised seed are infinitely superior in every respect to those produced from the imported exotic.

Upwards of a ton and a-half of Egyptian exotic cotton seed have been issued; the greater part of this has been sent to the Hon. Rustomjee Jamsetjee Jejeebhoy for planting on a very extensive estate belonging to that gentleman in the Goa territory, where the experiments are very extensive, and under the skilled supervision of a European gardener.

Of the Mysore acclimatised Egyptian seed a little over one and a-half hundredweights have been supplied. The greater part of this was also sent to Mr. Rustomjee, who will thus have the opportunity of having a fair trial between fresh exotic and partly acclimatised seed.

Of Sea Island cotton seed nearly two hundredweights were distributed. By far the greater part was sent to the collector of Khandeish. It would financially be a fortunate result if this cotton could be successfully acclimatised in any part of India, as its value is so very high. When New Orleans cotton is twenty pence a pound in the Manchester market, Sea Island is worth at least thirty-four pence per pound.

Of Berar indigenous cotton only twenty-five pounds were issued. This description has succeeded in the Khandeish zillah, and further experiments are advisable in those districts where the cotton indigenous to the country is inferior to the Berar variety.

The Dharwar indigenous cotton is a good variety of Indian cotton, and has a very fair name in the English market. A little over one hundredweight has been distributed, principally to districts where the local variety of cotton is inferior to the Dharwar indigenous.

During the year her Majesty's principal Secretary of State for India has sent out a practical gardener, Mr. Shearer, to assist in improving cotton. The Commissioner trusts that by next season Mr. Shearer will be sufficiently advanced in his knowledge of the country to actively undertake the special duties for which he has been appointed by government. Under the circumstances no departmental sowing operations have been carried on. Mr. Walton has, however, undertaken some private experiments, which he finds of considerable departmental benefit in showing the best way in which to undertake larger operations. He points out how, in his opinion, many experiments fail from condemnations being recorded on the results of imported exotic seed. Under the most favourable circumstances of importation, exotic cotton seed arrives in India with at least, on an average, 50 per cent. of the seed worthless. This is caused by the seed losing its germinating power whilst in transit. He believes many cotton experiments have been condemned on the very insufficient grounds of failure of exotic seed in places where different results would have been attained by trying seed that had become partially acclimatised to India.

The total amount of cotton supplied was as follows:—New Orleans American, 1866: 7 tons 10 cwt. 3 qrs. 23½lbs. New Orleans Dharwar, 1865: 39 tons 0 cwt. 1 qr. 22lbs. New Orleans Dharwar, 1866: 20 tons 12 cwt. 1 qr. 17½lbs. Peruvian Exotic, 1866: 8 cwt. ½lb. Peruvian Dharwar, 1866: 8 cwt. ¾lbs. Egyptian Exotic, 1866: 1 ton 12 cwt. 3 qrs. 1¾lb. Egyptian Mysore, 1866: 1 cwt. 2 qrs. 6lb. Sea Island Exotic, 1866: 1 cwt. 3 qrs. 26½lbs. Berar Indigenous, 1866: 25lbs. Dharwar Indigenous, 1 cwt. 12¾lbs. Total, 1865: 39 tons 1 qr. 22lbs.; total, 1866: 30 tons 17 cwt. 2¼lbs.

In conclusion, the Commissioner observes that the year under review has been a most exceptional one financial difficulties have been so great as to seriously discourage all improvements and extensions of cotton cultivation.

Manufactures.

Granite Working.—A new industry has lately been introduced into Glasgow—that of polishing granite, an art for which Aberdeen has long been noted. The works established near Pollockshields by the Scottish Granite Company are at present employed in the preparation of eight polished granite columns for the piers of Blackfriars-bridge. One cylinder now in course of preparation is about seven feet in diameter, and about eleven feet in length; and four of the number are to be about eight feet in diameter and twelve feet high. The material is the beautiful syenitic granite of Mull, which takes the finest possible polish.

Strengthening the Manholes of Boilers with Mouthpieces.—In one of the recent reports of the Chief Engineer to the Manchester Association, attention is drawn to this subject as follows:—"The importance of strengthening the manholes of boilers with mouthpieces is shown by the fact that nine explosions, by which fourteen persons have been killed and six others injured, have recently occurred to boilers in which this precaution has been omitted. In each of these explosions the primary rent has started from the manhole, and although in some cases the pressure of the steam has been considerably higher than it should have been, so that the explosions have been partly attributable to excessive pressure, yet they have been materially promoted by the weakening effect of the unguarded manholes, while others have been entirely due to that cause. The weakening effect of unguarded manholes is not produced solely by the amount of metal cut away, but to a great extent by the action of the covers. These are generally internal, and held up to their work by the pressure of steam as well as by a couple of stout bolts and nuts, suspended from arched bridges; and as the surfaces of the plates at the joint are not dressed smooth, but left rough, a considerable strain is frequently put on the bolts to make the joints steam-tight, especially when the cover does not fit the sweep of the boiler. Thus the action of the steam, combined with bolts, tends to force the cover through the manhole and split the boiler open. This is just the action that takes place. In some boilers it has been detected in an early stage, just in time to prevent explosion, while others have been known to burst shortly after the manhole covers have been tightened up, or the joints caulked. Nothing is easier than to strengthen these manholes, and this is done in all modern boilers turned out by first-class makers. The manhole mouth-piece recommended is an external one, made of cast-iron, and in the shape of a short cylinder, with a flange both at the top and bottom, the lower one being curved, so as to fit the sweep of the boiler to which it is riveted, while the upper one is flat, and fitted with a cover, secured with bolts and nuts. Both the cover and upper flange should be faced up true on their joint surfaces, while it adds a finish to the work to turn them up on their edge, as well as to face the cover on the outside for a width of about four inches, so as to give a true bearing surface for the nuts. For convenience in lifting the cover, a wrought-iron eye-bolt should be attached to it at the centre. The height of the mouth-piece should be sufficient to admit of the introduction of the bolts between the flanges for securing the cover, while the opening should be large enough to afford a man easy access—say fifteen inches—which, however, is a liberal allowance, and might be slightly reduced in special cases should it be desirable to do so. The metal should be an inch and a-quarter thick for steam at a pressure of 60lbs., while the bolts should be an inch in diameter, and spaced about six

inches apart. It is well to strengthen the upper flange by brackets, while the cover can be stiffened by ribs if required. By some makers the flanges are made as much as an inch and a-half thick. For steam considerably above 60lbs. on the square inch, mouth-pieces are sometimes made of wrought-iron, but those of cast-iron are found to work satisfactorily up to that pressure. No hemp ring will be required for making the cover-joint, but merely a little red lead and oil if the surfaces be properly got up, and provided that the lower flange be suitably riveted to the shell, little or no caulking will be required to make it steam-tight. This external manhole mouth-piece is not the only form adopted. Some boiler-makers prefer an internal one. Either of them if properly made works well. In double furnace boilers the mudhole—which is placed at the bottom of the front end plate, and below the furnace mouths—forms a second manhole, and should be guarded with a mouth-piece. When this is omitted, inconvenience is experienced from leakage at the joint, which not only disfigures the boiler but induces corrosion, in many cases so wasting that the front end plate has to be cut away and repaired. With good mouth-pieces, suitably got up, this danger is avoided. The mounting for mudholes is very similar to that recommended above for manholes, but the position below the furnace mouth does not allow room for a cylindrical mouth-piece sufficiently large to admit of a man's passing through it, and, therefore, instead of being cylindrical it has to be oval."

Commerce.

The Wool Trade.—The imports of wool last year again show a considerable increase. During the eleven months ending November we have received from Australia about 3½ millions; from India, 8½ millions; and from other quarters 13 million lbs. more, but from the Cape 2½ million lbs. less than during the same period of 1865. In the exports there is a material falling off, both as regards colonial and foreign wools—Belgium alone having taken eight millions less; France, 3½ million lbs.; and the United States and other countries about six million lbs. less this year than during the previous one; but with respect to home-grown wool the contrary has been the case, the exports to France having been considerably in excess of former years. There is but a slight increase in the value of the exports of woollen manufactures. The quantity of wool taken for home consumption last year exceeded that of the preceding one by about 40 million lbs. The total imports of sheep's wool, in 1866, were 790,458 bales, and of goat's wool, 3,920 bales.

Mineral Products of Spain.—Among the richest mines in Spain, the first that must be named are the quicksilver mines of Almaden, which, till the recent discovery of this metal in California, have almost exclusively supplied both Europe and America. The mineral districts of Almaden have already been worked by the Romans and by the Moors. Pliny has recorded two interesting facts: first, that the Greeks imported red cinnabar from Almaden 700 years before the Christian era; and 2nd, that Rome, in his time, annually received 700,000lbs. from the same mines. These mines are so extremely rich that, though they have been worked pretty constantly during so many centuries, they have hardly reached the depth of 330 yards. From 1820 to 1849 the average annual amount produced was 20,000 quintals, or 1,970 tons. At the present time the average annual product is about 1,500 tons, giving employment to from three to four thousand men. At the present time the yearly consumption of quicksilver does not exceed 31,000 quintals, about 3,100 tons, and is distributed in the following manner:—1,200 tons to Mexico, 1,000 tons to South America, and 900 tons to Europe. The mines of Almaden produce annually from 1,500 to 1,600 tons; those of California, 700 tons; Istria and Carniola, and other parts of Europe, 300 tons. The exportation of quicksilver from California is increasing every day, and the injurious competition made by that country in the American market with Spain threatens every day to become a monopoly. The mines of argentiferous lead are some of the most productive in Europe. Since the reform of the laws relating to mining in 1825 and 1849 the mines have been thrown open to foreign enterprise, and many mines have now been opened in the Gador and Luja mountains. In the province of Murcia more than 1,200 mines are being worked at the present time, and those that have been opened within the last few years in the Mount Almagrera are remarkable for the richness of the ore, the lead containing more than one per cent of silver. The mines of Vigen del Carmen, Observacion, Animas, La Esperanza, La Concepcion, La Estrella, and many others, are of great importance. The mines of La Carmen annually produce 20,700 tons of minerals; Las Animas produces 1,200 tons, the value of which may be estimated at six million reals, or £62,500. The annual production of the mines of La Estrella may be valued at 1,550,000 reals, or about £16,000. The other mines produce like quantities. Those of Linares, the property of the state, and worked by Government, are also deserving of notice. The number of workmen employed in the mines in the province of Murcia amounts to nearly 11,000, and they produce annually about forty millions of reals (£416,666.) The principal smelting works established at Carthagena employ more than 3,000 persons. The principal tin mines in Spain are those of Galicia and Asturia, and the production might be considerable. Zinc is also very abundant in the provinces of Guipuzcoa and Santander, and might equally be worked to advantage. By encouraging railway undertakings, that tend to unite the principal coalfields to the general network of lines, the Government would be enabled to develop to an enormous extent the metallurgical resources of Spain. The low price of fuel is most necessary in order that the smelting establishments may be profitably worked; this condition once fulfilled, and the necessary communications established, the means of transport facilitated in every way, with a reduction to a moderate tariff, the Spanish mines will increase considerably in value.

Colonies.

Coal in Tasmania.—Coal exists in most parts of Tasmania. Until lately, Hobart Town was chiefly supplied from the mines of New Town, a distance of about three miles from the city, and from Tasman's Peninsula. But the Seymour Coal Mining Company now takes its share of the trade, and the mines of this company are on the eastern coast. From New Town and Tasman's Peninsula is obtained anthracite coal; from Port Seymour, bituminous. But it is generally believed that coal beds of far greater value than these exist in other parts of the island, and Mount Nicholas has long been pointed to as the site of one. Of this, the following notice appears in an account of the samples of coal furnished for the International Exhibition of 1862:—"The seam of coal which crops out at various points on the side of Mount Nicholas, locally known as the Killymoon Seam, is estimated to occupy an area of about 14 square miles. Various other portions of the bed are equally accessible, but although they are mostly bituminous, they are inferior in thickness to the Killymoon Seam. Beds in the Mersey River have also been found, and, although limited in quantity, have been profitably worked, as they are easy of access. The coal is very bituminous, is used by the coasting steamers and in Launceston, and has been exported to Victoria. The bituminous coal from Hamilton is said to be very good. It lies about 40 ft. deep, in a seam 4 ft. 6 in. thick, and has been used by the Derwent steamers, from

the shipping place of which, at New Norfolk, it is about 20 miles distant. The coal formation on the south side of the island extends round the mouth of the Huon to S.W. Cape, within which range many deposits have been discovered.

The Post-Office Savings Bank System at Victoria has lasted a year, and the following statement shows what has been done:—Number of banks opened 44; number of accounts opened, 6,264; number of deposits received, 22,060; number of withdrawals paid 4,184; amount of deposits received £75,611 18s. 5d. amount of repayments, £28,604 3s. 10d.; balance to credit of depositors, £47,007 14s. 7d. The deposits during the past month that the system was in operation amounted to £4,105 5s., and during the last month they had increased to £11,560 9s.

The Revenue of New South Wales during the year 1866 amounted to £2,027,257, of which the following are the most important items:—

Customs	£862,258
Duty on sugar and molasses	15,563
„ spirits distilled in the colony	20,996
Gold revenue	26,591
Postage	78,000
Rents, exclusive of land	31,450
Stamps	71,000
Railway receipts	172,188
Telegraph „	33,020
Land revenue	510,826
Licenses	76,570

The estimated revenue for 1867 is £2,223,505.

Cotton in Queensland.—The success of cotton growing during 1865 has had the effect of forcing a larger quantity of land than in the previous year under that branch of cultivation. Those who have been growing cotton without exception have increased their operations, and there are numerous new growers. The present crop promises well. Should the season prove favourable throughout, cotton-growing is even expected to be the main crop of the colony, and to rank next to wool as a production. The large plantations on the seaboard are proving very successful.

Pauperism in New South Wales.—A colonial paper says:—"In spite of the evidences of material prosperity of the colony of New South Wales, there is a great deal of pauperism in the country. There are large numbers of unemployed people in Sydney; and in the interior scores of men looking for work are to be met with on the tramp. This state of affairs is discouraging, but at the same time it must be remembered that this pauperism has been forced upon us, three-fourths of these vagrants having arrived from Queensland."

Obituary.

Sir Stuart Alexander Donaldson died on Friday, the 11th instant, at Carleton Hall, Cumberland, the seat of his father-in-law, Mr. F. Cowper. Sir Stuart was the son of the late Mr. Stuart Donaldson, an eminent merchant of London, by the daughter of the late Mr. Cundale, of Snabgreen, Lancashire, and brother of the late Dr. Donaldson, of Cambridge, formerly head master of Bury St. Edmund's School, and a well-known classic and theologian. The deceased gentleman was born in 1812, married the daughter of Mr. F. Cowper in 1854, and for upwards of twenty years was head of the mercantile firm of Donaldson and Co., Sydney, New South Wales; from 1838 to 1859 he was a magistrate of New South Wales; was elected member of the council of that colony in 1848, and sat in the council and assembly till 1859. Sir Stuart formed the first ministry there responsible to Parliament, in April, 1856; was member and vice-president of the executive council, first minister and colonial secretary, subsequently colonial treasurer, a commissioner of railways in 1857, and one of the original fellows of the senate of the University of Sydney, from its foundation in 1850. In 1855 he was appointed consul-general of Sardinia, and knighted by patent in 1860. He was elected a member of the Society of Arts in 1863.

Forthcoming Publications.

Mining and Metallurgy of Gold and Silver. By J. Arthur Phillips. 8vo. *(E. and F. N. Spon.)*—This work will contain a description of the methods of occurrence of the above metals; geological characteristics of the principal gold and silver bearing districts, and notices of the most important mines; mechanical and metallurgical processes for treating gold and silver ores; machinery, apparatus, and appliances employed; assays of ores, and alloys of gold and silver; and annual yield of the principal gold and silver producing regions, &c.

Notes.

The Museum of Practical Geology, Jermyn-street, was, for the first time, lighted up on Monday evening, the 14th inst., as well as on the three following evenings, until 10 o'clock; and the Committee of Council on Education have ordered that in future the Museum shall be open to the public on the evenings of every Monday and Saturday until 10 o'clock.

First Pine-apples in England.—The following is from "Hardwicke's Science-Gossip":—"When Oliver Cromwell ruled in these realms, a present of pine-apples was one of the things which fell to his lot, and this was probably the first introduction of the fruit into England, although it was known on the Continent four years previously. Four years afterwards Evelyn writes of its appearance on the royal table. But the fruit, however much it may be extolled, is not the only good product of this plant. From the leaves thereof is procured a fibrous material, known and appreciated by the barbarous hordes of Africa and the semi-civilised Malays. The celebrated pine-apple cloth of the Philippines, resembling the finest muslin, is woven with the delicate fibres of the uncultivated pine-apple plant. This muslin is embroidered by the nuns of the convents of Manilla with excellent skill and taste, so that the "pina" muslin of the Philippines has become a celebrated article of manufacture. Mr. Bennett has observed in his 'Wanderings,' that one of the coarser fibres may be subdivided into filaments of such fineness as to be barely perceptible, and yet sufficiently strong for textile purposes."

Ingenious Register of a Ship's Course.—M. Corradi, an engineer of the "Compagnie de Navigation Mixte," of Marseilles, has invented a very ingenious apparatus, which he calls *loxodrographe*, and which may render great service for the exact indication of a ship's course. A roll of photographic paper is placed in the binnacle, and unwound by means of clockwork, following the centre line of the ship. This paper moves in a horizontal manner forward beneath the magnetic needle. The card bearing the points of the compass, in place of the star which usually indicates the north, is pierced with a small circular hole, above which is placed an object glass. The light admitted by this hole darkens the photographic paper underneath. If this paper were immoveable the impression would be a circular spot, but as it is in movement a line is described by the action of the light on the sensitive salts with which it is impregnated. Thus placed it is easily understood that, the object-glass always remaining at the north, and the paper following the direction of the ship at each change of course, the black line will take a corresponding direc-

tion, and in this manner it is only necessary to examine it and a map of the ship's course is obtained. The advantage of this method will be easily conceived. Besides the indications that it furnishes with great exactitude, it requires no particular care, and an exact idea may be formed any moment of the angle formed by the ship with the meridian.

The Standard Pitch of Munich.—It is announced from Munich that in the orchestra of the Opera and the Chapel Royal the musical pitch of the Conservatoire of Paris has just been adopted, by command of the King.

Correspondence.

The India Museum.—Sir,—With reference to the statement in Mr. P. L. Simmonds' paper, which appeared in last week's number of your *Journal*, to the effect that the India Museum is about to be transferred to South Kensington, I have to say that such is not the case, as provision has been made for it in the new India Office.—I am, &c., T. Forbes Watson.

India Museum, Jan. 14, 1867.

MEETINGS FOR THE ENSUING WEEK.

Mon.....United Service Inst., 8½. Captain J. H. Selwyn, R.N., "Breech-loaders, with reference to calibre, supply, and cost of Ammunition."
Society of Engineers, 7½. Presentation of Premiums. President's Inaugural Address.
Victoria Inst., 8.
London Inst., 7. Prof. Ansted, "On the Present Aspect of Geology."

Tues ...Medical and Chirurgical, 8½.
Civil Engineers, 8. Discussion on "Ships of War."
Ethnological, 8. Mr. J. Crawfurd, "On the Plurality of the Races of Men."
Royal Inst., 3. Prof. Tyndall, "On Vibratory Motion, with special reference to Sound."

Wed ...Society of Arts, 8. Mr. Rochussen, "On the Iron Permanent Way used on German Railways."
Geological, 8. 1. Mr. G. Maw, "On Chemical Analyses of Variegated Strata." 2. Mr. Ralph Tate, "On the Jurassic Fauna and Flora of South Africa." 3. Mr. G. Maw, "On Consolidated Blocks in the Drift of Suffolk."
R Society of Literature, 8½.

Thur ...Royal, 8½.
Antiquaries, 8½.
Zoological, 8½.
R. Society Club, 6.
Mathematical, 8.
Royal Inst., 3. Prof. Tyndall, "On Vibratory Motion, with special reference to Sound."
London Inst., 7. Prof. Herschel, "On the Laws of Storms."

Fri .....Royal Inst., 8. Prof. Odling, "On Mr. Graham's recent Discoveries on the Diffusion of Gases."

Sat .....R. Inst., 3. Mr. G. A. Macfarren, "On Harmony."

Patents.

From Commissioners of Patents' Journal, January 11th.

Grants of Provisional Protection.

Aniline colours, treating—3326—L. Schad.
Baling bands, fastenings for—3335—S. Wilson.
Blasting cartridges and fuses—3301—A. Rollason.
Bolts, securing the nuts of—3334—R. Bodmer.
Breech-loading fire-arms, and cartridge case extractors and cartridges for—3317 W. S. Mappin.
Cable stoppers—3319—J. Baker and J. Imray.
Carburetters—3308—W. Clark.
Cement—3388—J. Toussaint.
Centrifugal pumps—3336—M. Henry.
Clay, grinding—3376—H. Goodfellow.
Colouring matters—3195—C. E. Brooman.
Combustion of pulverulent substances—3354—W. E. Newton.
Compassees—2863—J. S. Gisborne.
Cotton gins—3342—G. B. Finch.
Electric currents, distributing—3298—J. P. Gillard.
Elevators—3314—A. V. Newton.
Engines, traction—2971—C. E. Brooman.
Explosive substances—3293—F. W. Reeves and J. B. Muschamp.
Fabrics, dressing, &c.—3285—F. B. Baker and L. Lindley.
Fabrics, elastic and ribbed—3350—S. Belfield.
Fatty bodies, preparing—3307—C. E. Brooman.
Fibrous substances, treating—3109—W. Taylor.
Fibrous yarns or threads—3277—W. and J. W. Wood.
Fire-arms—3316—M. Weber.
Fire-arms, breech-loading—3302—D. Kirkwood.
Fire-arms, breech-loading—3318—W. Wood.
Fire-arms, breech-loading—3339—F. Hayman.
Fire-arms, breech-loading—3356—R. L. Martin.
Fire-arms, breech-loading—3382—J. S. Benson and J. von der Poppenburg.
Furnaces—3309—J. Hauworth.
Gelatinous tissues, treating—3303—J. W. Swan.
Grain, millstones for grinding—3384—W. E. Gedge.
Gunpowder—3310—G. A. Neumeyer.
Hammers—3297—S. Chatwood and J. Sturgeon.
Heavy ordnance—3051—J. H. A. Gruson.
Horse rakes—3313—E. Howell and T. Hardy.
Hydrochloric and nitric acids—3269—I. Baggs.
Inkstands—3337—S. and J. J. Perry.
Knives, cleaning—3358—T. Huckvale.
Lead, &c., treating—3273—C. E. Brooman.
Liquids, filtering—3380—C. J. Wahab.
Locomotive machinery working without steam—3344—W. E. Gedge.
Machines—3161—W. E. Newton.
Madder—3386—H. A. Dufrené.
Metal tubes, cutting—3105—W. R. M. Thomson.
Moulding in green sand without patterns—3333—J. Goodfellow.
Mowing and reaping machines—3368—J. Howard.
Paint, uninflammable—3327—W. R. Lake.
Paper—3299—G. Bertram.
Railway carriages, couplings for—3360—W. R. Lake.
Railways, vehicles to be used on—3271—J. Murphy.
Railway wheels—3145—W. Brookes.
Reaping and mowing machines—3220—F. W. Turner.
Screw valves—3372—W. Clark.
Sea sickness, preventing—3338—M. H. Simpson.
Sheep and cattle racks—3306—J. Symm.
Ships, coating the bottoms of—3348—S. Parry.
Shovels and spades—3315—G. Nimmo.
Size, preparing—3311—H. Hall.
Skates—3312—C. Mole.
Soundings, taking—3346—T. and T. F. Walker.
Steam boilers—3279—H. W. Ripley and T. Barker.
Steam motor—3289—A. V. Newton.
Steel to iron, welding—3304—W. E. Newton.
Stench traps—3332—S. Buxton.
Steering apparatus—3321—J. McF. Gray.
Stone, cutting—2935—H. Hitchins and W. Wood.
Taps—3275—J. T. Kent.
Telegraph standards and insulators—3281—C. C. Adley.
Tobacco, receptacles for—3229—W. A. Richards.
Turbines—3320—F. N. Meixner.
Vessels of war—3352—T. Whitby.
Vessels, propelling—3233—C. E. Samuelson.
Vessels, propelling—3295—C. Randolph.
Vessels, propelling—3364—W. H. Harfield.
Wool carding—3322—W. E. Gedge.
Yarn, spinning—3329—A. V. Newton.

Patents Sealed.

1812. E. McNally.	1869. J. McVitie.
1814. W. Walker.	1907. A. Magnin.
1823. J. N. Fournel.	1943. E. H. Bentall.
1824. W. Naylor.	1972. W. E. Gedge.
1827. W. G. Walker & R. F. Smith.	1979. W. Beaumont and W. McMaster.
1830. J. Ward and J. Smales.	2048. G. B. Harkes.
1841. W. Thompson & T. Stather.	2086. J. B. Edmondson and J. Carson.
1842. R. Roger.	2117. A. V. Newton.
1846. A. Prince.	2706. C. E. Brooman.
1848. W. Justice.	2875. W. J. Matthews.
1849. J., C., and H. Sampson, and R. Burlison.	2931. H. A. Bonneville.
1852. W. Ager.	

From Commissioners of Patents' Journal, January 15th.

Patents Sealed.

1856. R. Soans.	1912. G. T. Bousfield.
1870. J. Macintosh & W. Boggett.	1913. G. T. Bousfield.
1877. J. and E. Goad.	1931. H. Lea and T. Lane.
1881. W. Tongue.	1953. J. Orr.
1890. H. Trotman.	1977. E. I. Billing.
1896. G. Canouil.	2342. J. Williams.
1897. G. Canouil & F. A. Blanchon.	2541. T. Forster.
1902. J. Saunders and J. Piper.	2711. T. Restell.
1911. T. Andrews.	

Patents on which the Stamp Duty of £50 has been Paid.

64. J. Coppard.	139. J. Thompson.
114. J. Howard, E. T. Bousfield, and J. Pinney.	89. W. Welch.
	82. W. E. Newton.
142. E. J. Vinot.	100. W. Denton & J. Whitaker.

Patents on which the Stamp Duty of £100 has been Paid.

72. J. Jameson.	130. W. W. Hewitson and B. Walker.
90. A. C. Twentyman.	
82. C. de Bergue.	209. F. Walton.

Journal of the Society of Arts.

FRIDAY, JANUARY 25, 1867.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'clock :—

January 30.—On this evening the Report from the Judges on the Art-Workmanship Competition will be read, and the competitors and their friends will be invited to be present. Sir Thomas Phillips, Q.C., Chairman of the Council, will preside.

February 6.—The following subject for discussion will be introduced by Mr. Henry Cole, C.B.:—"On the existing legal regulations in reference to the Cab Fares in the Metropolis, and their effect in rendering the Vehicles inferior to those provided in other European Capitals and the large Municipal Towns of this Country."

Cantor Lectures.

A course of Six Lectures "On Pottery and Porcelain," illustrated by specimens of various manufactures, and by photographs and diagrams, is now being delivered by William Chaffers, Esq.

Lecture II.—Monday, January 28.

Maiolica.—Italy, Spain, Persia, &c.

Lecture III.—Monday, February 4.

Fayence.—France, Spain, Portugal, Russia, Sweden, Denmark, &c.

Grès or Stone Ware of Germany and Flanders.

Delft Ware, &c.

Lecture IV.—Monday, February 11.

Oriental Porcelain.—China, Japan.

Lecture V.—Monday, February 18.

European Porcelain. — Italy, Germany, France, Holland, Belgium, Russia, Poland, &c.

Lecture VI.—Monday, February 25.

English Pottery and Porcelain.—Early History, continued to the beginning of the 19th century.

The lectures commence each evening at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend to each lecture. Tickets for this purpose have been issued to each member.

Art-Workmanship Prizes.

The works sent in competition for these Prizes are now placed in the Society's Great Room for the inspection of members and their friends.

Subscriptions.

The Christmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Cantor Lectures.

"On Pottery and Porcelain." By W. Chaffers, Esq.

Lecture I.—Monday, January 21.

The first lecture of the course on pottery and porcelain was delivered on Monday, the 21st, by Mr. W. Chaffers, who illustrated his remarks by the exhibition of a collection of very fine specimens of ancient pottery of the Egyptian, Greek, Etruscan, and Roman periods, which were attentively examined after the lecture by the members. Behind the chair were placed numerous diagrams of the forms of Greek vases, drawings of the potter's wheel, a Saxon grave, urns, &c. The lecturer commenced by speaking of the nature of clay, and the various changes it was subject to from its primitive state, through all the intermediate stages, until it culminated in the perfect vase, dwelling upon the desiccation and baking of the clay, the means adopted by potters in the formation of vessels, viz., the potter's wheel, modelling tools, moulds, &c., the skill exercised by the artists in decorating the ware, and the difficulties they had to contend with in painting upon the moist clay; the nature of the glazes employed by the ancients; the shrinkage while in the kiln, and many other curious facts in connexion therewith. Mr. Chaffers alluded to the extraordinary circumstance that notwithstanding the fragility of specimens of ceramic art, and their liability to injury, our museums throughout Europe abounded with perfect and uninjured examples not only of pottery, but of the still more fragile material, glass. For the preservation of these we are indebted to the simple piety of the ancients, who, according to their rites of burial, placed in the grave those objects which the deceased esteemed most during his lifetime. Thus we find by the side of the skeleton, in the simple tumulus of earth, in the cinerary urn, or in the stone sarcophagus, gold and silver personal ornaments, fictile vases, and other ceramic remains, glass vessels, weapons, &c.; and this is the source of our possession of such valuable testimonies to the habits and customs of the ancients, for, without exception, all the relics preserved to us have been discovered either in places of sepulture, or in the exhumation of long-buried cities, devastated by conquest, or overwhelmed by volcanic eruptions. The lecturer then noticed the description given by Herodotus of the city of Ecbatana, the capital of Media, surrounded by seven walls of as many different colours, which he inferred were of bricks, or tiles with enamelled surfaces, and compared it with a building of similar character, described by Sir H. Rawlinson as still existing at Birs Nimrud, in Chaldæa, which, from the custom of placing cylinders in the buildings, is ascertained to have been restored by King Nebuchadnezzar 605 B.C., who designates it "The seven spheres of Borsippa." This structure consisted of six stages, each about 20 feet high, of pyramidal form, dedicated to particular planets, and vitrified or glazed with the colour attributed to it by astrologers. Adverting to the glazed Babylonian bricks, Mr. Chaffers showed the early knowledge of the use of the stanniferous enamel glaze as a covering for earthenware. He alluded to the researches of Mr. W. Kennett Loftus in Chaldæa, who discovered piles upon piles of earthenware coffins covered with glaze in a cemetery at Warka, proofs of the successive generations by whom this method of burial was adopted from its foundation until the place was abandoned by the Parthians, a period probably of more than 2,000 years. The earthenware of Egypt next claimed his attention, which he described as a sort of siliceous frit, frequently covered with a greenish blue glaze; the deities and emblems discovered so abundantly in the catacombs and tombs were many of them steatite, carved into form, and placed in the kiln. The earthenware vessels were used to contain the

waters of the Nile, and for various household purposes. The favourite ornamentation on their vases was derived from the lotus, its buds and flowers, the borders and details being taken from the petals, stems, and divisions of the calix. The most flourishing period of Egyptian art is assigned to a very remote date, viz., 2,000 years before our era. The period of the Ptolemies is known by the marked influence of Greek artists. The frit gives place to a pottery, coarse and soft, sometimes painted on the plain surface and sometimes glazed. This was continued down to the second and third centuries of our era, when Egypt was under Roman domination. In speaking of the Greek fictile vases, Mr. Chaffers said they were found in large quantities in the sepulchres of Etruria during the last century, and hence they were erroneously called Etruscan, even after they were still more abundantly discovered in Magna Græcia, Sicily, Attica, &c. It is indisputable that these vases are the productions of Greek artists, and the style of painting, the designs as well as the inscriptions, are decidedly Greek. This portion of the lecture was illustrated by some remarkably fine Greek vases, kindly lent to the lecturer by Mr. Felix Slade, Mr. Henderson, Mr. Battam, and M. Rollin. For the purpose of classifying the Greek vases he divided them into five periods, assigning approximate dates of antiquity, as follows:—First archaic period, previous to the eighth century B.C.; second archaic period, from the eighth to the seventh B.C.; third archaic period, from the seventh to the sixth B.C.; fourth, the finest period, from the sixth to the fourth B.C.; fifth, the decadence, from the fourth to the second B.C. The peculiar characteristics of each period are as follows:—The first archaic period; of these, the earliest specimens of Greek fictile art, most are discovered at Athens, Corinth, Melos, Camirus in Rhodes, and Etruria. They are very rude, painted in reddish brown or black, on ash-coloured ground, with chevrons, concentric circles, stars, &c., and primitive representations of men and animals. The vases of the second archaic period are abundantly supplied from Camirus in Rhodes, as well as other parts of Greece. They show a great improvement in the drawing of the figures; they are usually of cream-coloured clay, painted with crimson and white, and red on black, the details being scratched with a point, the style of ornamentation being two or more rows of animals (real or imaginary), of birds, harpies, sphinxes, &c. In the third archaic period are found the most valuable Greek vases, of a more artistic character than those which precede it. The figures are painted in black, on a red ground, and the designs are confined to a square tablet between the two handles, the rest of the vase being painted a lustrous black. Mythological and heroic subjects are now introduced, and complicated groups of figures, chariots, and occasionally inscriptions. The fourth is the best period of Greek art. These vases may be especially distinguished by the designs being left red, the ground filled in with black, and the details of costume, features, and anatomical delineations produced by black lines. Sometimes are found black figures on red, and red figures on black, on the same vase. This may be considered a transition from the archaic to the more artistic style. The fine vases of Nola may also be attributed to this period. The fifth period may be called the decadence, and dates from the accession of Alexander the Great, B.C. 336 to B.C. 186, when it is presumed the fabrication of painted vases altogether ceased, shortly after the edict of the Roman Senate against the celebration of the Bacchanalian festivals in that year. As we approach the second century B.C. we find less freedom in the design, a certain mannerism in the drawing, as well as a greater profusion of ornament.

Various specimens of Etruscan pottery were exhibited to illustrate the lecturer's remarks, and the Roman section was copiously illustrated by selections from his own collection, displaying the most striking varieties. The red ware of Arretium was described, as well as the Samian ware, so frequently discovered on the sites of Roman cities, ornamented in relief with mythological subjects and elegant scroll patterns; it was used by the Romans at the table for their meals. Mr. Chaffers also described other varieties of Roman ware found in Britain and Germany, and vessels of various forms, small drinking cups, inscribed with short convivial sentences, as "Imple," "Reple," "Bibe," "Vivas," "Da vinum;" mortaria, lamps, clay statuettes, &c., specimens of which were upon the table. In conclusion he spoke of the Saxon period, and described the contents of some of the Saxon or Frankish graves, which are dispersed over Northern Gaul, and the earthenware vessels so commonly found among them.

Seventh Ordinary Meeting.

Wednesday, January 23rd, 1867; Charles Vignoles, Esq., F.R.S., in the chair.

The following candidates were proposed for election as members of the Society:—

Brereton, F. S., 5, Cannon-row, Parliament-street, S.W.
Briggs, Henry R., George-yard Wharf, 36, Upper Thames-street, E.C.
Brinjes, J. F., 25, Fieldgate-street, E.
Cawston, Samuel W., Balham-hill, S.
Grisbrook, W., 154, York-road, Lambeth, S.
Stanger, C., Harley-villa, Grove-street-road, South Hackney, N.E., and 8*a*, Worship-street, E.C.

The following candidates were balloted for, and duly elected members of the Society:—

Bevan, Phillips, Albert-terrace, Windsor.
Davis, Sir John Francis, Bart., K.C.B., Club Chambers, Regent-st., S.W., and Hollywood, Henbury, Bristol.
Leeke, Admiral Sir Henry J., K.C.B., K.H., Theydon-park, Epping, Essex, and 5, Euston-place, Leamington.
Lewis, Evan, Aberdare.
Phillips, Thomas Henry, 51, Lime-street, E.C.
Pitter, Joseph, 2, Thanet-place, Strand, W.C.
Railton, George W., Alderley-edge, Manchester.
Roberts, Howland, Neilgherry-house, Hampstead, N.W.

The Paper read was—

THE IRON PERMANENT WAY IN USE ON GERMAN RAILWAYS.

By T. A. Rochussen, Esq., C.E.

The system of making railways, by levelling a layer of ballast, and forming an upper-structure of wooden sleepers, cast-iron chairs, topped with a wrought-iron rail, and held together by a wooden key, has, for a great number of years, appeared to German engineers to be unworthy an age in which the manufacture of good iron, and its composition into an efficient bearing system, are far better understood than thirty years ago, when the importance of railways as the principal arteries of our social and commercial intercourse was only just foreshadowed.

While locomotives and rolling stock had in their construction and performance progressively represented the advance of practical science, and embodied the genius of the designer, the care of the builder, and the aptitude of the worker in metal, to provide for all the requirements of traffic, it was felt in Germany, as well as elsewhere, that the time had arrived to apply the same intelligence to permanent way; and that it had become necessary, as much as possible, to reduce the variety of material, and to avoid that most liable to perish, like wooden sleepers, or cast-iron chairs, alike destructive to the wood below and the wrought iron above; and finally, to get rid of the crude contrivance of fixing rails by means of wooden keys. For this reason, the double-headed

rail, copied from English precedent, has enjoyed little favour in Germany, and where adopted, is gradually superseded by the more general practice of flat-bottomed rails, with or without bed plates on the sleepers.

The failure of Barlow's permanent way (perhaps a great deal owing to the use of inferior material) unfortunately discouraged railway directors from pursuing or sanctioning experiments in the right direction, and jeopardising dividends. While, therefore, different scientific papers published a number of schemes for the construction of iron permanent way, some patented, others given away *pro bono publico*, and all of them eagerly discussed at the meetings of practical engineers, the first step to realize a project was only made at the end of the year 1863, by putting in hand the different systems herewith illustrated, some of which came into actual use in the beginning of 1864, others in 1865.

The theory which guided these constructions may be summed up as follows:—

The nearest approach to perfection in a permanent way is to present to a moving load a sufficient, an unmoveable, continuous, and even resistance, as the only means of obviating the oscillation and thumping of fast trains.

Although the weight and height of the rails have been steadily increased, in order to spread the rigidity of the line over a large number of cross sleepers, there remains in practice an unavoidable deflection of rail between the points of support.

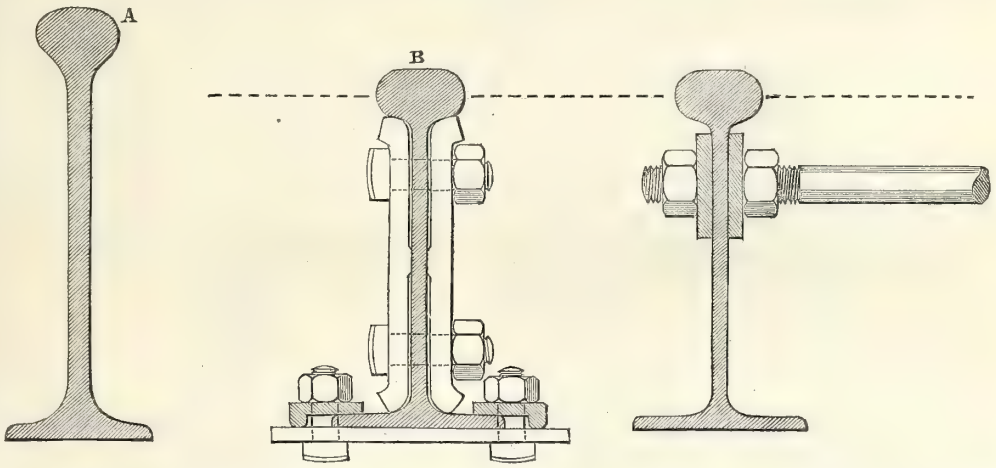
The bending down of the sleeper-end, taking place during the passage of the engine and the oscillation of the carriages or trucks, especially with old or soft wooden sleepers, sufficiently shows that the pressing load is not spread equally over the whole length of the sleeper, and is not evenly supported for the entire length of the wheel base, but that the chair, or point of support, receives a succession of blows, with the whole weight of the load resting on the axle.

If, therefore, we could devise a longitudinal way, possessing sufficient rigidity to transmit the pressure of the load over a large bearing surface, we should avoid the wave-like motion occasioned by the cross sleepers.

This resistance to pressure can be obtained in a simple ratio, by increasing the flat base resting on the ballast, or more economically, by increasing the height of the rail, since the power to support grows in the square ratio of the height.

The boldest and simplest plan of iron permanent way under consideration, was that advised by Mr. Hartwich, engineer of the Rhenish Railway, and laid down on the right bank of the Rhine, between Coblentz and Oberlahnstein, on a perfect level, and also between Mechernich and Enskirchen, the latter an incline of 1 in 70, and on a curve of 800 yards radius.

Fig. 1.



The ballast, always an object of especial solicitude with Prussian engineers, is of broken flint, and laid in a channel three feet broad at the top, shelving down to one foot, and eighteen inches deep. The rails shown in section A (see Fig. 1) eleven inches high, weighing 115 lbs. per yard, with a flat bottom of four inches, are placed immediately in contact with the ballast, and sleepers or bedplates are dispensed with. The space between the rails up to the middle of the head, and also the clear way outside the rails, are filled with fine gravel, tightly rammed in.

The rails are fished vertically and horizontally, as the rail of section B, nine inches high, which has since been ordered to the extent of fifteen miles, on the line between Kempen and Kaltenkirchen, and its adoption is likely to extend with the growth of Rhenish railways to the exclusion of the eleven-inch rails, which were found unnecessarily heavy and expensive. These rails are nine inches high with a flat bottom five inches wide, weighing 85 lbs. per yard; the head, down to one inch of the web, is formed of steel, the web of fine grain, and the bottom of fibrous iron.

The vertical fish-plates, eighteen inches long, have two rows of fish-bolts for each rail-end, and to increase their stiffness have a longitudinal rib, resting against the web of the rail. The horizontal fish-plates, also eighteen inches long, are eight inches wide, and their connection with the rail is established by means of a cramp-plate, held between the nuts of the fish-bolt, and bearing upon the base of the rail. The use of this cramp is principally to allow a greater width of fish-plate, and to protect it against buckling up by the pressure of the rail. The rails are held to gauge by one-inch round bars, placed three feet apart, the ends of which are provided with a screw-thread, nut, and washer, at each side of the web, so as to allow an easy adjustment of widening or narrowing the rail distance to the proper gauge. Alternately, the cross, or gauge bars, are put either three inches from the top of the head or three inches from the bottom of the rail.

The whole weight of the system is 145 tons per mile per single line of way; the contract price all round being £13 15s. per ton; or, exclusive of ballast and laying down, £1,985 per mile.

The engineer reports:—"Since June, 1865, the double line from Coblenz to Oberlahnstein and the Mechernich line have been worked with tender-engines weighing 37½ tons; no alteration has taken place in the level of

the way, and the rails have nowhere worked into the ballast. The gauge has not in any instance been disturbed, the repairs of packing have been very trifling, and far less than on the line with cross-sleepers. The whole length forms a continuous, unmoveable railway; and although there is a little bending at the fish-joints, this inconvenience is imperceptible compared with the advantages of the whole system. The filling of the rail space with gravel, provided a more efficient security against sliding than the dogs and bolts in the wooden sleepers. The motion on the rail is perfectly free from oscillation and thumping; the noise of the passing train has a deep rolling sound, and although some passengers, who are acquainted with the peculiarity of the construction, pretend that the line is hard, the difference is not noticed by the majority of travellers. Whether the rigidity of these high rails will be more detrimental to themselves than the constant bending on cross-sleepers, time will have to show. If this disadvantage should manifest itself, it could be met by increasing the elasticity of the springs; on the other hand, the rigid surface offers a saving of traction power and wear of wheels, considering that with rails bending between sleepers every wheel practically runs on an inclined plane. It may be urged that, if once the rail heads should be worn out, the whole system will require renewal, but as an extensive experience with steel headed rails in Prussia, during 14 years, has shown that the life of a good rail, even under very onerous circumstances of traffic, is about 21 years, this objection falls to the ground, the more so since the rails of the present day, on wooden sleepers, have already reached the same weight per yard as our whole system without sleepers."

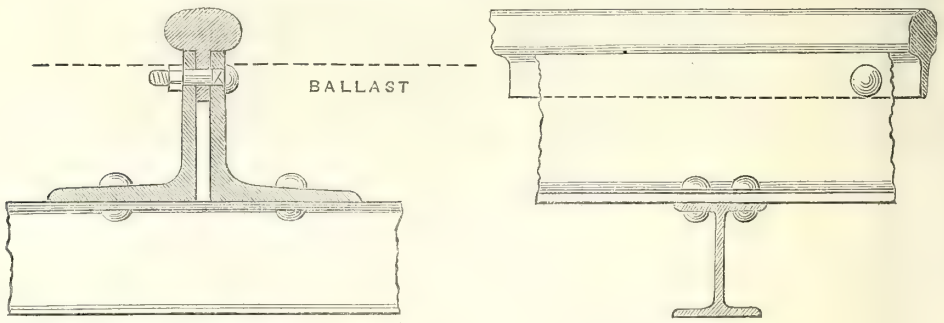
In the beginning of the year 1864 the Hoerder works, in Westphalia, supplied the Brunswick Railway with the two systems of iron permanent way represented by Figs. 2 and 3, each of about 1,100 yards in length, and some time afterwards with another variety of the same system, represented by Fig. 4.

The two first are lying side by side on the distance between Brunswick and Wolfenbuttel, that portion of the main line from the west to Berlin on which the wear of oak sleepers and the general repairs of the permanent way had been the heaviest of the whole distance between Cologne and Berlin.

The three systems embody the principle of supporting the head of the rail between the vertical arms of two angle bars, riveted together, and held to gauge by cross-bars, the dimensions and distance of which, as well as of the angle-bars themselves, being varied in order to ascertain the maximum limit of saving material which may be approached without jeopardising the efficiency of the construction.

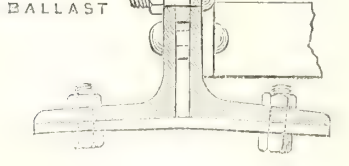
In the system shown in Fig. 2, the longitudinal rectangular angle-bearers measure 6in. × 6in. × $\frac{1}{2}$in., and are placed half an inch apart, to allow the web of the head rail to slip in. The gauge, or cross-bars of T iron, 4in. × 3in. × $\frac{3}{8}$in. are placed five feet apart, and are riveted below to both the horizontal arms of the angle-bars.

Fig. 2.



The head-bolts, connecting the head-rail with the rail-bearers, are 16 inches apart, and the bolt holes are elliptical, to allow contraction and expansion. The ends of the angle-bars are joined horizontally by fish-plates, 12in. × 12in. ×in. × $\frac{1}{2}$in., fixed with eight screw bolts, say two bolts to each end. The head-rail and rail-bearers break-joint—the ends of the former being thus supported by a continuous bearing of the latter. This system of construction gives 334 square inches of horizontal bearing surface per running foot, that is to say, 300 square inches from the horizontal arms of the angle, and 34 square inches from the cross-bar.

Fig. 3.

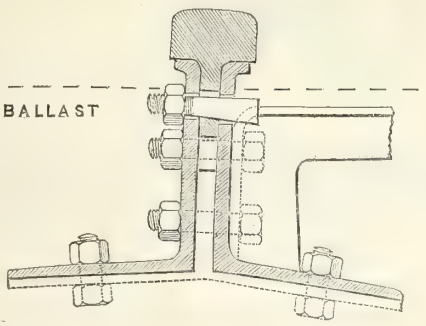


In system No. 3 (Fig. 3) the rail-bearers are formed by angle-bars of 93°, the dimensions of which are reduced to 5$\frac{1}{4}$in. × 5$\frac{1}{4}$in. × $\frac{1}{2}$in., the head-rail, head-bolts, and their distance apart being the same as in system No. 2; but the cross-bars, here placed only three feet apart, were made of flat bar 3in. × $\frac{1}{2}$in., ending in a T section, which is riveted through the two arms of the rail-bearers. In order to prevent the squeezing together of the latter, a half-inch fillet-plate is inserted between them. The fishing of joints is effected as in system No. 2, and the horizontal-bearing surface is 274 square inches per running foot of railway.

On the wear of the railway, the engineer, Mr. Scheffler, reports as follows:—"The two systems lie side by side in a straight line, half the distance being on well-drained large gravel, the other half in fine gravel mixed with clay, very impermeable to the percolation of water. Both lengths have been worked for more than two years, and are in excellent preservation, continuing to bear a heavy express, passenger, goods, and mineral traffic. The state of the rails has been uninterruptedly satisfactory, and they have not required the same labour of keeping up which was necessary for the other portion of the railway. This contrast was especially remarkable in winter during a prolonged low temperature. After the thaw in the spring of 1865 only in the system No. 3, in those portions of the line where the ballast is unusually bad and clayey, a few instances of sinking occurred,

but not to the same extent as on the line with cross wooden sleepers; however, on the larger portion of system No. 3, and on the whole of system No. 2, no packing or adjusting of any kind has been necessary. This favourable result is, perhaps, to be ascribed to the great height of the rail-bearers, which permit the bearing surface to lie deep in the ballast, and reduce the influence of frost on the base of the rail. The packing and lifting, when required, are an easy operation, and these constructions have shown no instability—a gratifying fact, since eminent engineering authorities, looking at the flat base of the rail-bearers, predicted a shifting sideways of the whole line. After two years' heavy traffic no displacement has been perceptible; all the component parts of the iron permanent way are in their original good condition; not a single rivet has worn loose, but the nuts of the head-bolts require now and then to be tightened with a spanner, as in those of the fish-plates of the ordinary construction. The iron, including the portion submerged in the ballast, has been oxidized to a trifling extent, and hitherto experience has not justified the preference of one system over the other. The motion on both systems is a little harder, but, at the same time, much more steady and smooth, than on the most carefully constructed permanent way with wooden sleepers. Hitherto it has been impossible to note any difference in the motion of the carriages during the various influences of extreme heat or cold, it is the same in winter as in summer. In the manufacture of the rail-bearers for systems Nos. 2 and 3, the Hoerder works found a difficulty in rolling the top of the vertical arm to a sufficiently clear edge, and this inconvenience necessitated their being planed. In order to obviate this expensive operation, the Hoerder works proposed to roll the top of the vertical arm with a bulb or rib, which allows a true edge to be produced without any further mechanical finishing. The Brunswick Railway thereupon resolved to adopt this bulb angle in their last system, No. 4 (Fig. 4.), embodying the weight of the smaller section No. 3, which in practice had proved

Fig. 4.



sufficiently strong, at the same time giving a conical form to the head bolt, in order, when tightening the nut, to press the head rail down on the rail-bearers. This head is made of cast steel. While keeping to the weight of the former section they increased the height of the vertical arm to 6½ inches, the horizontal arm to 5½ inches, the thickness of both being ⅜ths of an inch full. Another deviation from systems Nos. 2 and 3 is the form of the cross-bars, which are of channel or C iron, 4 inches × 1¾ inches × ⅜ths of an inch, placed five feet apart, as in system No. 2, and are fastened with bolts and nuts through the two vertical rail-bearers. The horizontal supporting surface of this system is 306 square inches per running foot of railway. It does not appear advisable to place the cross-bars at a greater distance from each other, since they not only serve to keep the line to gauge but also contribute in holding each pair of rail-bearers together to prevent their buckling and, at all events, the greater rigidity of the system compensates for the trifling, if perhaps superfluous, outlay. Experience will teach us the maximum distance of the cross-bars, and also whether a large number and their submersion in the ballast offer (as we have hitherto found) a sufficient resistance to the supposed tendency of the railway to move sideways, or whether it is advisable, for additional security, to adopt keel-fishes. The cost of the iron permanent way, exclusive of ballast and laying down, has been 36s. per yard, or, with laying down, £3,200 per mile, as against 25s. per yard or £2,250 per mile for the ordinary construction with wooden sleepers. The weight of the three systems is—No. 2, per yard, 354lbs.; No. 3, 295; No. 4, 300. The Hoerder works supplied the material for systems Nos. 2 and 3 at £13 5s. per ton, delivered at Brunswick; but for system No. 4 stipulated an advance of 5s. per ton, on account of the wider dimensions of the angle bars, which necessitated the use of better iron. The building up and laying of the permanent way, after the labourers got used to the work, progressed rapidly; the cost of laying down was 10d. per yard, as against 7d. per yard for the old system. The ballast under the iron way is of the same depth as that under the wooden sleepers, viz., 12 inches, and practice has shown this to be sufficient.

"The experience of two years has not yet furnished conclusive data exactly to fix the cost of keeping up the line, but we have found—

"1. That packing has been much less needed than with the ordinary cross-sleepers, and the expenses under this head are merely nominal.

"2. The rails have not required any repairs; neither head-rail nor rail-bearers have been renewed or altered; and it is remarkable that the rail-ends have suffered much less (owing to their uniform support) than on the cross-sleepers.

"The principle of longitudinal construction is, in theory, the most correct, and is borne out by practice. The even continuous bearing is of immense importance to the permanent way, as well as to the rolling stock, and gives a much easier motion to engines and carriages.

"The uniform rigidity of this rail system, and the perfect support of the head-rails, show a marked improvement in the wear of the heads. The use of rivets —in places where frequent renewals are not likely to occur, as in parts covered by the ballast, and therefore not much shaken—is not objectionable. The number of component parts is not large, their connexion is easily established, and practice has proved the construction to be strong. The rigidity of the iron permanent way, both vertically and horizontally, is much greater than that of the cross-sleepers. This is proved, not only by the analysis of form and dimensions of the section, but also by the steady motion of the rolling stock, and this advantage is conspicuous in express and heavy mineral trains."

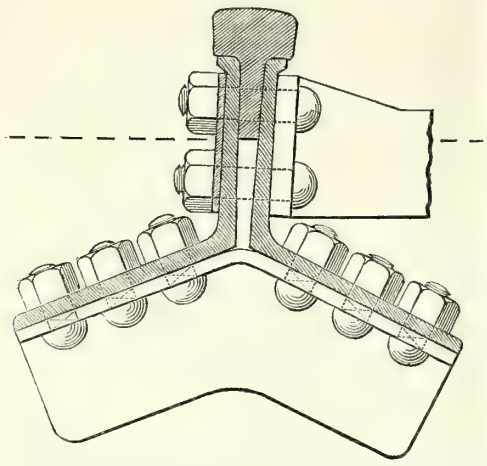
Thus far Mr. Scheffler. After the favourable experience obtained on the Brunswick line, the Hanoverian, Cologne-Minden, the Saxon and Wurtemberg State railways, have resolved to lay down experimental lengths of iron permanent way, constructed on analogous principles.

The Hanoverian system, illustrated by Fig. 5, was made by the Hoerder works, according to the specifications of the engineer of the line, but it does not appear to offer any advantage in theory, while its cost is much higher than that of the Brunswick system. The Hanoverian permanent way has the same cast-steel head as system No. 4; but the rail-bearers, ½ inch thick, are formed of angle-bars of 115°, 5½ inches high, and 6⅓ inches base, giving a horizontal bearing of 12 inches wide, equal to 288 square inches per running foot of railway.

The rail-bearers are riveted together, with a fillet plate, as in system No. 3. The head-bolts, conical, as in system No. 4, placed 18 inches apart, have a collar

under the nut, which, pressing the rib of the angle, counteracts the supposed tendency of the head-rail to incline outwards.

Fig. 5.



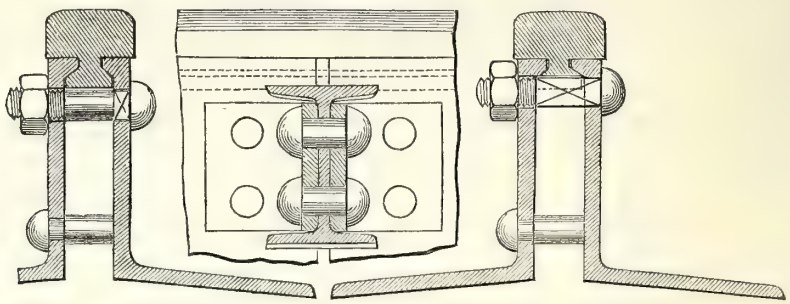
The bars, 3 feet apart, of 3 inches × ¾ inch flat bar, are, as in system No. 3, riveted with T angles to the angle-bearers. The keel fish-plates are formed of T iron, 5 inches × 2½ inches × ½ inch. About five miles of this iron permanent way were laid down in 1866, which give a very satisfactory result; they will, however, only be thoroughly reported on after next spring.

A variation of the iron permanent way of systems Nos. 3 and 4, is now being constructed at Hoerde for some German railways, on a plan patented in this country by the author, and the advantage of which was developed during the manufacture of the material for the Brunswick and Hanoverian way. (Models, full and half-size, were on the table.) When the metal used for the head-rail was changed from the use of iron to the use of cast-steel, it was no longer practicable to punch the bolt holes in the web, and every hole had, at considerable expense, to be bored and slotted out.

Besides, under all circumstances, particular care was required in correctly adjusting the holes in the web with those of the rail-bearers. These combined considerations made it desirable to devise a system establishing a direct and strong connexion of the head-rail and rail-bearers, without the head bolts passing through both, and led to the combination illustrated by Figs. 6 and 7.

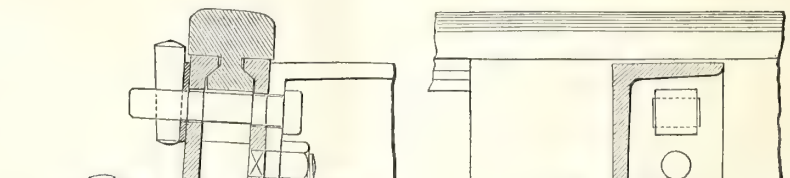
The bulb or rib of the vertical arm instead of being placed outside, as in the Brunswick permanent way, No. 4, is here turned inwards, and is rolled into a dwarfed T section, thus forming a groove into which the ribs or bulbs of the rail-bearer gripe; and the whole system is

Fig. 6.



tightened and firmly held together by the screw bolts, or wedge keys, passing through the rail-bearers under the head without touching the web at all. The head bolts are placed 20 inches apart; and in order to prevent their pressing the angle bars closer together than necessary, a stop rivet is placed under each of them near the throat of the angle, which thus keeps each pair of rail-bearers at the proper distance from each other.

Fig. 7.



In Fig. 7 a plan is suggested to effect economy of material by slightly reducing the height of the rail, and replacing expensive screw bolts with cheaper keys and wedges, all of which can be simply rolled as a bar and cut off to the requisite size.

The cross bars of these systems can, of course, be made

of any section of iron. Those now making are partly of double T iron, partly of angle iron, bolted to the inner arm of the construction. By these means the outer arm of the rail-bearer can at all times be removed for the purpose of shifting, reversing, or renewing the head rail, without disturbing the gauge of the railway. The cross bars are most conveniently fitted near the end of the rail-bearers, where they contribute to stiffen the fish-joint, and at the same time serve admirably as supports of the points, which move easily over the flat surface of the cross bar.

In order to prevent the sliding backwards and forwards of the head rail by the friction of the wheel, a square stop bolt is applied to the head, passing through a notch in the web at each end of the rail. A few holes are punched here and there in the horizontal arm of the rail-bearer to assist in draining the ballast.

It is scarcely necessary to urge anything in favour of the principle of longitudinal permanent way generally. In some countries the first cost may appear greater; but the ever-increasing expense of keeping up wooden sleepers, especially in hot climates; the interruption of and danger to traffic during repairs; and, on the other hand, the advantages offered by the iron way of decreased wear of rolling stock, as well as increased safety and comfort in travelling, are considerations of such importance as to render the abandonment of the present cross-sleeper construction merely a matter of time.

In the systems just described the life of the iron parts is practically unlimited. The only portion subject to gradual wear is the steel head, weighing about 34lbs. to the yard; and this economical application of the more expensive material justifies the engineer in using crucible cast steel of a high class, instead of the cheaper but less durable Bessemer steel, which, for good financial reasons, is the only steel which railways have hitherto allowed themselves to use.

The weight of the new system, as per dimensions shown in Fig. 6, is 223 tons per mile; the cost, inclusive of laying at 9d. per yard, about £3,100.

The weight of system No. 7 is 193 tons, and the cost about £2,700 per mile of single railway. But these prices are based upon the use of high-class Prussian iron, at £12 to £14 per ton, and bolts from £24 to £30 per ton; with the use of English iron the cost per mile should not exceed £2,200 per mile.

I would finally urge, in favour of the iron permanent way, the consideration that wood is getting scarcer and dearer every year, and may well be saved from decaying in the ballast in order to fulfil the nobler mission of meeting the numerous wants of our domestic and social habits and dwellings. And if railways in England and its colonies were generally to adopt the iron permanent way, an immense impulse would again be given to an industry now unfortunately languishing, but the prosperity of which forms the back-bone of the wealth and power of this country.

Weight and Cost of System No. 6 per Mile, calculated on the price of Prussian Iron.

(Per Length of 20 Feet.)

				£	s.	d.
2 head rails	460 lbs.,	at 16s. 6d.	cwt.	3	7	9
4 rail bearers	1,180 „	12s. 0d.	„	6	5	7
3 cross bars	170 „	13s. 6d.	„	1	0	9
4 fish plates	26 „	12s. 0d.	„	0	3	0
62 bolts and nuts	48 „	30s. 0d.	„	0	12	9
22 stop bolts	8 „	24s. 0d.	„	0	1	9
	1,892 lbs.			£11	11	7
= per mile, 223 tons				£3,056	18	0
Laying down, at 9d. per yard				66	0	0
Total				£3,122	18	0

Weight and Cost of System No. 7 per Mile, calculated on the price of Prussian Iron.

(Per Length of 20 Feet.)

				£	s.	d.
2 head rails	460 lbs.,	at 16s. 6d.	cwt.	3	7	9
4 rail bearers	1,050 „	12s. 0d.	„	5	12	6
4 cross bars	44 „	12s. 0d.	„	0	4	8
4 fish plates	26 „	12s. 0d.	„	0	3	0
26 wedges and cotters	37 „	18s. 0d.	„	0	5	11
18 stop bolts	7 „	24s. 0d.	„	0	1	6
16 bolts and nuts	16 „	30s. 0d.	„	0	4	0
	1,640 lbs.			£9	19	4
= per mile, 193 tons				£2,631	4	0
Laying down, at 8d. per yard				57	0	0
Total				£2,688	4	0

DISCUSSION.

Mr. Robert Mallet, F.R.S. (responding to the invitation of the chairman), said he had listened with great pleasure to the paper, some of the details of which he was before, to a certain extent, acquainted with, having himself seen the permanent way alluded to in Germany last year. He thought no doubt could be entertained, in the present day, that the epoch of timber sleepers was approaching its close, but the question arose what we were to substitute for them. There were two or three principles which were incontrovertible with regard to permanent way—one was that the nearer we approached to a lathe bed the nearer we were to perfection, but in a lathe bed we had a uniform load passing over it at a uniform speed, and a uniform support for the entire length; therefore, we could afford to make the bed of perfect stiffness, and could maintain it true. A railway was placed under different circumstances. It could only be supported at intervals. For, even if it was a continuous iron way, resting upon continuous ballast, it was in fact only supported at intervals. If the table of the rail itself were of such a weight, and possessed such inertia that the load in passing over it caused concussion at the immediate attachments of the rails, it mattered not if the material of the ballast were india-rubber, the result would be the destruction of the rolling-stock in proportion to the inertia of the table it ran upon. They might mitigate this by springs as regarded the carriages, but they could put no springs between the wheels and the axles. Wheels of 4 feet, or 4 feet 6 inches diameter, and often 2½ inch tires, with axles often 7 inches, and seldom less than 4½ inches diameter, were in themselves prodigious hammering masses, and at high speed there was practically a succession of hammering blows. Take any point in the circumference of a wheel: that point described a cycloid, and at each moment of its touching the rail the tangent of the cycloid was perpendicular to the rail, and thus the point descended with a direct hammering blow, the effects of which were in proportion to the weight of the wheel and the velocity with which the point of the periphery struck the rails. There was therefore a succession of blows, which they must mitigate as best they could. If they had an enormous inertia in the metallic parts of the rails, the result would be similar to that illustrated by Belzoni the traveller, who placed a heavy anvil on his chest, and allowed blacksmiths to strike it with hammers. This appeared to be a feat of marvellous strength, but so long as his ribs were strong enough to bear the weight of the anvil, the force of the blow was expended on the anvil itself, and the heavy permanent way just did the same thing. It therefore appeared to him that if they adopted iron sleepers they must arrange to make the bearing elastic in some way, but how that was to be effected with these deep rails and double angle irons appeared to him a matter of some difficulty. There could be no question that an enormous advantage was gained by the substitution of steel for

iron in the upper part of the rail. The London and North-Western Railway, which was considered as a pattern railway in respect of the large traffic and the regularity and rapidity with which it was carried, had substituted steel for wrought-iron rails, without reduction in the weight of metal. They were not attempting to economise in the outlay for the substituted rails, but the economy was looked for in the greater resistance to wear and tear. He believed the experience of Mr. Rochussen with steel rails for the light traffic of the German lines had been different to that in this country generally. He apprehended the life of a steel rail, instead of being 21 years, would, on some parts of the London and North-Western, scarcely be as many months. At the same time, there was no doubt the steel rail was the right thing. If they got a material which did not hammer down, or laminate, as the surface of soft wrought iron did, there was the greater reason why, with an enormously rigid material like steel, they should have beneath it an elastic support. He only ventured to assert that as a principle, because if he went into particulars it would lead him to talk of himself as a permanent-way inventor, and he would be sorry to do that. He confessed he did not see that that was effectually done by these angle-irons. It was very similar to what our ingenious fellow-countryman, Mr. Bridges Adams, had patented; the main difference was that he turned the angle-irons the other way. It seemed to him, in the arrangement adopted on the German railways, there was a certain liability to become uneven. The steel top, which bore the load, itself rested upon the narrow edges of these two angle-irons. In all these systems the question was what amount of surface had they in the angle-iron to support the steel table above; because though the steel top might be permanent, it was doubtful whether the angle-iron might not give way at the point of contact with the steel top. He confessed that the bearing surface in the case before them appeared to him exceedingly small, and he apprehended some difficulty in that direction. But no man, not even the chairman, who was himself one of our most successful designers of rails, could predict beforehand what would be the results of the working of any permanent way; nothing short of actual trial under rolling loads would decide whether a permanent way would answer or not. He was far from attempting to dogmatise with respect to these German lines. The system might be found to answer there better than he expected; and his general observation of those lines showed that for the most part they had hitherto worked well.

Mr. Rochussen wished to speak with the highest respect of Mr. Adams's system, and he regretted that it had not been adopted in this country to the extent which he considered its merits deserved. The difference between the two systems was, that Mr. Adams's was a suspended rail, held with two angle bars, in which the angle, instead of standing up, was hanging down. It would have been well to have had more experience of that system.

Mr. Varley remarked that a rigid permanent way appeared to be excellent to a certain extent, but that a due amount of elasticity in the bearings must be provided. It occurred to him that it would be well to ascertain positively the flexure of the rail, and then make it so convex as to keep it level by the weight. He had passed over the railway at Chat Moss, where the road was highly elastic, and it was the smoothest travelling he had ever experienced.

Mr. W. Botly said, mention having been made of the Bessemer cast-steel, some few years ago it was considered a great triumph of science that steel could be produced in about two hours, which operation formerly took, on an average, about a fortnight. It had been stated in the paper that the Bessemer steel was not so good as that which had been converted by the crucible process. He wished to know whether this was generally admitted. He apprehended that the welding of the harder material (steel) upon one of a more elastic nature (iron) furnished the conditions that were required for a permanent way. He begged to ask whether greater inconvenience, in respect of the wheels of the carriages not biting the rails under certain circumstances, was experienced with steel rails than with iron rails.

Mr. Rochussen said no one was more convinced than he was of the merits of the Bessemer invention. But on the other hand he believed Mr. Bessemer himself would be the last to advance that his process could produce a metal which in every way equalled the old crucible cast steel. It was a method of converting cast iron into malleable iron, and then into steel, which had all the convenience of being cheap, and of enabling them to deal with large masses of material. That system had been worked as successfully in Prussia as in this country, and he believed the manufacturers of Prussian Bessemer steel had no reason to be ashamed of their production. He admitted that the "biting" of the wheel on a steel rail was less than that on an iron rail, but they found less inconvenience from that in Prussia, inasmuch as the weight of the rolling stock upon the same wheel base was almost double that of the rolling stock used in England. First class carriages weighed from 10 to 11 tons. The luggage trucks were of the capacity of 10 tons each, and this remark would more or less meet the observation made by Mr. Mallet with reference to the supposed light traffic on the Prussian railways as compared with this country. These rails had been laid down on the German lines for the most part where the traffic was exceedingly heavy, and where it was necessary to provide something more durable than the old system afforded. The duration of steel rails, which he had advanced as being 21 years, was proved by the steel rails laid down at the Hamm station in Westphalia, which might be regarded as a counterpart of the Crewe station in this country—not that the traffic was so great, but it was the principal junction on the Continent for the mineral and coal traffic; and when a discussion on steel rails took place at the Institution of Civil Engineers, he produced some rails which had been taken from that junction, where they had been in use $12\frac{1}{2}$ years, after having sustained a traffic of 50 millions of tons of goods. Those rails, which were of the Vignoles form, had then only one side of the head slightly abraded; they were not in any way worn, and were fit to work for another five years at least, having the other side of the head untouched. Those rails were only 56 lbs. to the yard, having been made at a time when engines weighing from 37 to 48 tons were not dreamt of, and when, if such engines had been in use, iron rails of 85 lbs. would have to be laid down. With regard to steel-headed as compared with solid steel rails, he would remark that it was the compound nature of the rail which formed the backbone of support to the load. As Mr. Mallet observed, they wanted elasticity, and how did they provide it in a steel rail? They could not weld the steel to iron upon that large scale; therefore the steel was made to rest directly on the material which had the greatest affinity for it, viz., puddled steel, and below that they placed the most elastic fibrous iron that could be found. If, from motives of economy, they did not use cast steel for the head, they employed puddled steel, and fine grain iron for the web, such as was known in this country as the Low Moor, and again fibrous iron at the bottom. But in speaking of this kind of permanent way, regard must be had to the support it received from the ballast which, in the Prussian system, formed a most important portion of the line, for the work ordinarily thrown upon the sleepers was, in a great measure, done by the ballast, and by that means the violent concussions described by Mr. Mallet were avoided, the ballast in reality taking a large portion of the work of the line.

Mr. Juland Danvers wished to ask one or two questions, being interested in the construction of railways and public works in India. It seemed to be

universally acknowledged by the preceding speakers that the use of wood for sleepers was condemned. He would be glad to know why that was the case? He saw in this country wooden sleepers almost universally adopted, and this was also the case on the Continent, except on some of the German lines. In America iron had rarely been introduced for sleepers, and yet it appeared that wood was now generally regarded by the profession as a failure. This was a very important question as regarded India, where timber was plentiful, but hitherto they had been unable to supply iron; all the iron was obtained from Europe, and this increased very much the cost of railways in India. Wood had certainly failed there as sleepers, and half the lines were constructed with the iron pot-sleepers. He was anxious to ascertain why, if good durable wood could be obtained, at a much cheaper cost than iron, it should not be made use of; and why, as a general rule, iron was so much preferred? He knew many instances in which iron had cracked, while wood often lasted a considerable time. A short time ago he was requested by the India Department of the Government to inquire into this question, and the conclusion which he reluctantly came to, after taking all the evidence he could collect, was, that unless a cheaper and more durable wood was obtained in India, it would be desirable to employ iron sleepers very generally in that country.

Mr. Mallet added, on the subject of wooden sleepers in America, that the abundance of that material put iron sleepers quite out of consideration. Wood was almost a drug, while iron was the most expensive material that could be employed in construction in that country. The railway system was begun there by using strips of wood with bar iron, little better than hoop iron, on the top; now they had iron rails, and by-and-bye they might get to iron sleepers. With respect to sleepers in India, hard wood was principally used for the purpose, and was said to be very durable, if protected from the attacks of the white ant; otherwise it was rapidly destroyed. In tropical climates, not of the arid nature of a large portion of India—such as Panama—wooden sleepers had disappeared in a remarkable manner very rapidly, though composed of very hard wood. Wood was an increasingly dear commodity in this country, and would not stand the traffic of our lines, unless oak were employed, which could not be obtained in sufficient quantity. He believed the chairman would confirm the statement that in Russia oak sleepers were used almost entirely.—[The Chairman said this was the case in Russia wherever it was possible.] With reference to what had fallen from Mr. Rochussen on the subject of the different qualities of steel for rails, he (Mr. Mallet) did not think it of much importance whether crucible steel or Bessemer steel were used. It was simply a popular error to suppose that Bessemer steel was worse for the purpose than the best cast steel made by cementation in a crucible. He had seen as good steel made by the Bessemer process as by that of cementation, but the commonest Bessemer steel could be made into good steel, possessing every necessary quality, by allowing the metal to remain in a melted state for some time in a reverberatory furnace. M. Sudré was the first to show that steel could be melted in a reverberatory furnace, and that if the mass of molten metal was covered by a coating of glass, of the quality of ordinary wine bottles, the steel was effectually protected thereby from the action of any sulphurous matter which might be contained in the fuel. Independently of that, however, a new process of steel manufacture had grown up since the introduction of the Bessemer process. It was found that very excellent steel might be made by melting down scrap iron in pots, which might be heated twenty at a time in the Siemens furnace; and, with the addition of spiegel-eisen to the fused mass, and by stirring it up well, it was converted into steel. That process was now in operation by Mr. Siemens, and the result of his working was, that he could make a ton of steel with the consumption of a ton of coal; and he (Mr. Mallet) had no doubt that, though the Bessemer process would always be regarded as a grand revolution in metallurgic art, the last process to which he had alluded, had a vast future before it. The great advantage of it was, that old wrought iron rails might be cut up, melted, and reproduced as cast steel.

Mr. Livesey stated that on the London and North-Western Railway many thousands of tons of steel-headed rails had been laid down, consisting of Bessemer steel welded to the body of the ordinary rail; but between the Bessemer steel and the ordinary rail there was inserted a puddled bar of very soft iron, and by that means they got an almost perfect weld. He knew several railways in this country on which the old rails were being replaced with rails with Bessemer steel heads welded as he had described. He had reason to believe that the steel-headed rail would supersede the solid Bessemer steel rail. He had heard that in America the solid Bessemer steel rails had given way to a great extent in severe weather, and it was thought they would have to fall back upon the steel-headed rail in preference.

The Chairman said, before proposing the customary vote of thanks to the author of the paper, he would briefly express his own opinions on the subject, and in so doing he was sure Mr. Rochussen would pardon him if he differed from him in some of the points brought forward. Mr. Rochussen had proceeded, as far as he (the Chairman) understood, on the principle of making the bearing surface and rail as rigid as possible; but as far as his own experience went—and he believed it was that of most engineers—there should be, as Mr. Mallet said, some elastic substance interposed to guard the necessarily stiff rail from the impulsive action of the engine and train that ran over it. Thirty years ago that was demonstrated almost to a certainty. The line between Manchester and Bolton was laid in the most rigid manner possible, the consequence of which was a continual fight between the railway and the locomotive, which thus became mutually destructive to each other. It was admitted that there must be elasticity, and the reason why there was the smooth motion over the line at Chat Moss, which had been mentioned, was because of the elastic base on which the rails were laid. Therefore he did not concur in the principle laid down by the author of the paper. He would not cavil at the multitude of parts constituting the permanent way, or at his ingenious contrivances for securing the rail, so as to diminish the expense of his system; but for his own part, he thought that this complication produced more harm ultimately than was counterbalanced by the saving of expensive material. He had yet to learn, and he feared Mr. Rochussen had not sufficiently considered, what would be the effect under severe traffic of the bearing of the steel rail-head upon those narrow supports. The last speaker alluded to what was going on on the London and North-Western Railway; but perhaps he was not aware that for the last few years the specifications for the manufacture of rails had usually been that the hardest material should be put at the top, and the base should be formed of fibrous iron. The highest point of excellence at which that system had arrived was the substitution of steel for the top of the rail, and practically they had now the means of connecting the steel top with the base and sub-base of the rail by welding, in a manner more simple than that described in the paper, and without involving its many complications. With respect to the question which had been asked by Mr. Danvers, why wooden sleepers were to be abandoned, he (the Chairman) would say that his old-fashioned notions led him still to be an advocate for wooden sleepers. He thought when they looked in the first place at the admirable simplicity of a fished rail, without chairs, laid upon wooden sleepers, and considered the first cost of that system, and also of its periodical renewal; and when, in the second place, they calculated how much more capital had to be expended in laying down one of these expensive iron systems, they would find, spreading

the cost over a number of years, that the wooden system was the more economical. He had found in South America, and especially in Bahia, a hard wood, which resisted the white ant provided it was cut at the proper season. He found that the cost of sleepers of that wood was very little more than the softer wood imported. With respect to India, he might state that 20 years ago he had the honour of reporting to the East India Company npon the introduction of railways in India, and he recommended at that time that the harder woods of the country should be employed as sleepers, because it was well known that if certain hard woods were cut at the proper season, they would resist the white ant, and last for eight or ten years. Moreover he had known creasoted timber to last for fifteen years without the least decay. He had tried the iron pot sleepers; wherever there was sand and perfect drainage, those sleepers succeeded, as, for instance, in Egypt, but if the ballast was composed of broken stone or clay, they gave way. The Chairman concluded by proposing a cordial vote of thanks to Mr. Rochussen for his paper.

The vote of thanks having been passed,

Mr. Rochussen, in acknowledging the compliment, said he had brought this paper before the Society simply as a record of what had been done in Germany. He confessed he thought, when he first saw some of these plans, they could not answer, but experience had shown that they were at least worthy of some consideration. The compound rail had been in use in Germany 15 years, and it was found to be a step in advance, and upon that the systems he had just explained were in some respects founded. But perhaps they were more applicable to hot climates, where suitable wood for sleepers was difficult to be obtained. The system of steel making described by Mr. Mallet was not new in Germany, for a manufactory had been established in Westphalia which produced the same results, though by somewhat different means.

PARIS EXHIBITION, 1867.

To the general regulations published by the French Imperial Commission was appended a table of dates assigned for the termination of the various stages of the undertaking; the building was to be completed by the first day of December, and the installations of exhibitors by the fifteenth of January. As regards the building, there was a pretty general feeling that the promise could not be kept; but although the hammer still rings in the great temple of industry, and the paint brush has still a vast amount of work to do, the Imperial Commission virtually kept its promise, for all has been done that was actually necessary for the purposes of the exhibition. Workmen are now completing what may be called the extra portions of the building, such as the projecting roofs over the four main entrances, the grand vestibule, and other parts, but all the industrial courts—or galleries, as they are called, in the sense of the application of the word to picture galleries, which may be on the ground-floor, as those of the new Exhibition all are—were completed and glazed, all the avenues and passages laid in cement, and ready for the fittings to be erected about the time specified. This is a fact which deserves to be recorded, and which holds out the best possible guarantee for the fulfilment of the remaining promises of the programme. The amount of work that has been executed, and the regularity with which all the various operations have proceeded, reflect the greatest credit upon the directors of the undertaking, and have called forth the admiration of all who have visited the works from time to time.

A simple statement of what has been done, and is now in hand, will be the best comment. Commencing, then, with the outer zone or gallery—the great machinery and processes court—workmen are finishing the great windows over the entrance doors, as well as the arcades below, and the projecting *marquises*, or roofs, for the convenience of visitors; painters are swung by hundreds just beneath the huge roof, covering the dusky iron with a tint of light chocolate or coffee colour, and picking out the lines and rivets with vermilion and white; glaziers are filling in the windows as fast as the iron men leave them, and the whole enormous area below is cleared. Along the entire centre of this enormous circular gallery is a double row of cast iron pillars, about 15 ft. high, and 8 ft. apart, joined together by longitudinal and transverse lattice girders, and having large brackets standing out on each side; these brackets are to receive the shafts for the conveyance of power to machinery in motion; and on the girders above is being constructed a gallery, which will be about 10 ft. wide, and will enable visitors to pass along the entire length of the machinery court, and survey the Exhibition on each side with advantage. As this gallery occupies no space that could otherwise be appropriated, it will be a clear gain to the public. There will also be a passage below between the pillars.

In some parts of this court the foundations for heavy machinery are being prepared, and it would be well that those who have much to do in this way should lose no time; they can work now without interruption, whereas shortly this will not be the case. In the British portion of the machinery court some partition walls have been run up, which indicate that applications for space in this court have been more numerous than in the alimentary gallery beyond, some portion of which is thus taken into the former.

Proceeding inwards to the industrial galleries, called intermediate, as lying between the greater outer zone of the machinery court and the fine-art galleries of the centre, we find the carpenters busily at work in all directions; on the French side a great amount of wood-work is completed, and more under hand; in several classes the courts are not only formed, but nearly the whole of the framework of the cases is in position, and might be finished off, as regards carpenters' work, in a few days; the high partition walls required for the tapestry of the Gobelins and other manufactories are partly completed, and almost every portion of the French industrial courts is under hand. It is nearly the same in most of the other foreign courts; each country is being fenced off from his neighbour, and getting his main wood-work in place; the limits of Northern, Southern, Eastern and Western Powers are defined. Russia is indicated in one place by a characteristic pierced wooden railing, with heavy corner posts, mounted on stone pedestals, which will form the limits of the courts belonging to that country. Proceeding on the tour of the building, we traverse the small countries, or rather the small spaces devoted to the vast countries of China, Japan, Mexico, South America, &c., and arrive in the department of the United States, where the carpenters are hard at work. The remaining portion is devoted to Great Britain; here the sappers are now marking out the floor, and there is nothing to hinder the immediate erection of partitions, stands, and cases.

It was said that portions of the floor were to be covered with asphalte, but this appears to have been an error; at any rate there is no appearance of the asphalte furnaces; and the deliverance from its stifling fumes must be a source of satisfaction for all engaged in the building. The whole of the exhibiting space in the intermediate galleries is floored with wood, and the work is well done. The avenues and passages are all laid in cement, or in what is called *béton aggloméré*, which presents no difference to the eye or the foot.

The fine-art galleries, which form the inner ring, are not quite finished, but will be very shortly; the roofs have all been glazed for a considerable time; the floors of the larger gallery—that appropriated to the fine arts pure, painting, sculpture, architecture, &c.—are laid in cement, while the gallery of the history of labour, or retrospective museum, has an oak floor. The walls

of the greater portion of the fine-art gallery have been covered with wood, papered, and coloured a Venetian or Pompeian red. Suspended from the ties of the roof are semi-opaque screens, or false ceilings, to moderate the light; in the department of the gallery situated in the straight portions of the building, the effect of these screens is agreeable, and they present nothing remarkable to the eye, but in the curved portions of the gallery—and all the British fine art gallery is in the circular part of the building—the effect of these screens is most disagreeable; the first thing seen on entering the room is this screen, which looks like a huge comma dropping from the ceiling, with its tail running round the corner. It is to be hoped that a false ceiling of muslin, stretched from wall to wall, or some other mode of moderating the light will be adopted by the British Commission.

The retrospective gallery is in nearly the same stage of advancement as the preceding, and in the French portion cases and stands are already being got into place here and there. The entrances of the compartments of this gallery are being fitted with solid doors, which run upon rods, and can be firmly secured by lock and key, so that this rich collection will at night require no watchman, and yet be perfectly safe from depredation.

Within these galleries is the central garden, with its terrace and broad verandah all round. The face of the wall towards the garden has been plastered, the upper portion being decorated with a frieze of red marble, relieved by green marble and some slight ornamentation over the doors of the principal avenues. The verandah is quite finished, with the exception of the last touches of the painter.

It may be mentioned that in the French department the classes are all painted upon the pillars in the industrial galleries, while in the other portions of the building the names of the various exhibiting countries are exhibited over their locations. The radial avenues, as well as the concentric passages, are being covered, experimentally, with a white awning, with a coloured scolloped border, which has a very good effect.

Quitting the building we come to the alimentary class under the great *marquise*, or verandah, which encircles its outer iron wall. The fronts of cafés and restaurants on the French side are fixed in their place; a space is being prepared for the medical attendants, and the terrace or promenade under the verandah is being cemented. It is to be hoped that arrangements for refreshment will be made here for the exhibitors and others during the arrangement of the contents of the exhibition. The Russian restaurant is also in hand.

The Imperial commission has just taken possession of its rooms in the large house built for the accommodation of the executive officers and juries.

In the garden, the royal pavilion of Great Britain is rising rapidly on the spot opposite to the Oriental building erected for the Emperor of the French; it is a solid construction of stone, relieved with red bricks, having three sharp pointed roofs, one transverse and two longitudinal, and containing three apartments, a large one in the rear and two smaller ones in front. Not far from the royal pavilion is the English boiler house, with a noble chimney shaft; the latter is finished, as well as the foundations, but not the superstructure, of the former.

A very useful feature of the arrangements is a covered way, which leads from the railway station just beyond the limits of the grounds to one of the side doors of the building itself, so that all who arrive by rail will be under shelter the whole way; this covered way is nearly finished, and will shortly be connected with the entrance by a vestibule. On the other side of the building is another large covered way for carriages to pass under and set down their occupants.

Speaking of railways, it may be mentioned that an iron tramway for the service of the exhibition is now being laid round the building, inside as well as outside, with a branch leading to the special exhibition railway, which will communicate with all the main French lines.

The arrangements for the horticultural exhibition and the great aquariums, as well as those of the various commissions, are being carried out steadily, but it will be more convenient to speak of these in a future number.

Beyond the exhibition grounds, the steel bridge, which crosses the opening made in the quay, is completed; a large and convenient landing place is being formed for those who arrive by water, and who may enter the grounds of the exhibition either by the way beneath the bridge or by the main entrance in the quay. On the right and left of this landing place, but on a level with the quay, two large restaurants have been erected, and one of these will, it is said, be under the direction of two well-known English caterers.

POPULAR EDUCATION IN GERMANY AND SWITZERLAND.

The following is a further communication from Mr. Joseph Kay to the *Manchester Examiner and Times*, in addition to the one which appeared in the *Journal* for the 11th January:—

Will you permit me to conclude the slight sketch I have offered you of the progress of the education of the people of Western Europe, by describing shortly what the people themselves are doing for the education of their children in the purely democratic cantons of Switzerland.

But let me first remind your readers, that even in those German states in which the greatest progress has been made, the work of national education has been earnestly commenced only since 1820, when these countries were beginning to recover from the terrible consequences of the Bonapartist wars.

Prussia and Saxony were the first to treat the education of the children as a national duty. They were the first to devote the power and the resources of the state to the serious promotion of their work.

They have done much more for its development than any other German state. But even Prussia and Saxony only commenced this work after 1820, and one great motive which induced the Prussian government to do so was the desire to improve the mental and physical condition of the classes from which the ranks of the army were mainly recruited, and so to render the nation better fitted to contend with its powerful neighbours. How wise this policy was the war of last year has shown.

The other German states slowly followed the example of Prussia and Saxony. All the principal states have now put these laws in force, but in some, as in Hanover and Bavaria, the work has been too recently commenced to allow us, as yet, either to look for great results or even to expect that the effects of the previous state of ignorance and neglect have been entirely overcome.

In Prussia and Saxony, however, one-sixth of the whole population is under the care of educated teachers.

In Prussia alone, in the year 1861, there were:—3,096,546 children in regular daily attendance at these schools; 25,969 primary schools, many of them containing five or six class-rooms; 46,227 teachers, all of whom had been specially trained for their duties. These results had been obtained between the years 1820 and 1861.

But, remarkable as these statistics of the great German kingdom are, it is even more interesting to observe what is being effected in Switzerland, because the governments of the 22 cantons of that country are the purest possible forms of democracy. All the adults vote in the election of the members of the cantonal governments of the federal parliament. Nearly all the land belongs to

the peasant farmers. There are scarcely any great proprietors. There is no titled class. There is no state church.

I merely mention facts. I am not arguing in favour of democracy. I want to show what the people themselves have done, under such a state of political circumstances, for the education of all the children of the nation.

Up to 1832 the cantonal governments were more or less oligarchical, or under the influence of a small wealthy class. About 1832, the old and more aristocratic forms of government were overthrown, and the present purely democratic system was substituted.

Now, the great development of the education of the people in Switzerland began in 1832, after the overthrow of the more aristocratic forms of government. And it is a curious fact, that since the Swiss people have actually governed themselves, they, the most purely democratic people in the world, have done more for the education of all the children and youth of the nation than any other country in the world.

But here again it is necessary to remind your readers that the inhabitants of some of the cantons are Protestants and of others Romanists. The Romanist cantons did not commence the work of national education in any earnest spirit until a few years ago. They have not, therefore, made nearly so great a progress as the Protestant cantons. But now, both Romanist and Protestant cantons have put in force the laws I am going to describe.

Every Swiss parent is obliged by law to satisfy the local authorities that his children are being properly educated, either at home or in some school of the parents' selection, from their fifth to the end of their fourteenth, and, in some cantons, to the end of their sixteenth year. The Swiss consider the proper care and education of the young to be a matter of such vital importance for the best interests of the nation and of the people themselves, that they are most rigorous in the strict enforcement of these laws. In the best educated cantons no children are neglected. The physical, moral, and religious training of all—even the poorest—are most carefully fostered and watched over by the State.

In the manufacturing districts, the children are allowed to begin to work in the mills at the age of twelve or thirteen, on condition:—1. That they obtain from the school inspector a certificate that they are able to read and write. 2. That they continue to attend the school classes a fixed number of hours every week, until the completion of their 15th or 16th year. The local authorities are, as I mentioned in a previous letter, empowered:—1. To raise the school rate. 2. To provide schools, teachers, and play grounds. 3. To maintain and furnish the school buildings. 4. To provide all necessary apparatus. 5. To pay the teachers' salaries. 6. To provide houses and gardens for the teachers. 7. To supply the children of poor parents with decent clothing for school attendance. 8. To warm and light the schoolrooms. 9. To pay the school fees for poor children.

All these matters are subjects of distinct legislative provisions.

The town schools often contain five or six class-rooms, each superintended by an educated teacher. In these so-called primary schools, the children of nearly all classes of society begin their education. I remember being sent by the mother of a rich Geneva banker to see his young children in one of the class-rooms of a village school in the canton of Vaud. Besides these primary schools, the Swiss establish in each town one or more of what they call secondary schools. In these, a superior classical, mathematical, and scientific education is given by professors from the universities. In these secondary schools the children of the richer classes continue their education. But even in them, places are provided for poor boys who distinguish themselves in the primary schools, and who wish to educate themselves, either to be teachers or for some business requiring scientific knowledge.

I have seen in these secondary schools in Switzerland the clever sons of working men being educated at the expense of the country in science, mathematics, drawing from models, designing, &c., in the same classes with the children of richer parents.

All parties in Switzerland, Romanist and Protestant, rich and poor, combine—

1. To save the children from the streets. 2. To train them up in clean and healthy habits. 3. To teach them the principles of their parents' religion. 4. To give them as good an education as can be imparted between the ages of five and sixteen. 5. To aid clever children to continue their education after leaving the primary schools, if they show any peculiar ability.

But to do all this, it was absolutely necessary to train good teachers. For this purpose the people of these democratic cantons have taxed themselves to establish and support 13 admirable colleges for the education of teachers.

No person is allowed to officiate as a teacher in Switzerland until he has obtained—

1. A certificate of education from the examiners appointed by the government of his canton. 2. A certificate of character from his religious minister. 3. Certificates from the professors of the college where he was educated, of his fitness to be entrusted with the education of children.

I visited the teachers' cottages at Lausanne, on the Lake of Constance, in Argau, in the Canton of Berne, at Hofwyl, at Fribourg, St. Gall, Zurich, and Solleure.

The students for the thirteen colleges are selected from the candidates for admission. The education given in the colleges comprises—

1. History. 2. Geography. 3. Mathematics. 4. The elements of the physical sciences. 5. Music and singing. 6. Drawing. 7. Farming or gardening.

To nearly all these colleges are attached farms and gardens. The students work like peasants on these lands, under the guidance of skilled men. They learn how to cultivate and manage a farm, how to cultivate a kitchen garden, and how to prune trees. This work invigorates their frames, accustoms them to humble toil, makes them understand the labours and habits of the peasant farmers, cultivates in them a sympathy for the people among them they will have to live and labour, and prevents the high intellectual training of the college from unfitting them for their humble duties in the village. Besides this, they thus acquire in many of these colleges a scientific knowledge of the business of the people among whom they will have to spend their lives. This enables them to be useful to the parents of their children, to win their respect, and to disseminate among them knowledge which is advantageous to them and the nation.

The students remain in these colleges two or three years. The expenses of their board and education are borne by the government. The life in the college is so arranged or ordered as to prepare the young men for their humble lives in the villages. The young students are, therefore, during their life in the college, accustomed to simple fare, to the dress of a peasant, and to humble and arduous duties, while they are receiving a high intellectual training. They are made to clean the rooms of the college, to take care of the sleeping rooms, to cultivate and prepare the vegetables for the meals, to serve by turns at the tables, and to work like labourers upon the farm attached to the college. The consequence is, that, when they go into the villages as teachers, they find themselves thoroughly accustomed to the humblest duties and associates. They find their work in the villages less laborious than their life in the college, and this makes them contented with their position.

The teachers in Switzerland are the helpmates of the religious minister, the guardians and trainers of the children, and the friends and enlightened associates of the farmers and peasants. If this is true, do you wonder that the Swiss are willing to lavish such large funds upon the training of the teachers of their children?

In the canton of Berne, which has a population of between 400,000 and 500,000, the democratic government had provided three of these colleges. The most interesting college was the one which was managed, at the time of my visit, by that good and earnest man Vehrli.

My brother, Sir James Kay-Shuttleworth, was the first to introduce this institution to the knowledge of Englishmen. After he had been there, I visited Vehrli several times. About a mile from the gates of the old city of Constance, in the canton of Thurgovie, upon a rising ground overlooking the great inland sea, stands an ancient turretted mansion, which was formerly the palace of the abbot of a vast convent, the buildngs of which still remain.

The democratic government of the little canton of Thurgovie had set apart the abbot's palace, with a good farm surrounding it, for the purpose of a college for the education of the teachers of the canton. Such a change had that old magician—Time—effected in the uses to which the old palace was devoted. It was all furnished in the simplest possible manner. The chairs and tables were of deal. The linen was coarse, but clean. The rooms, so far as the furniture was concerned, might have been the rooms of a poor peasant's cottage. But the books in the class-rooms, the diagrams of the last mathematical lessons chalked upon the blackboards in the lecture-rooms—the maps on the walls—the models—the objects for the scientific lessons—the drawings of the students—the music books—and the musical instruments, all tell the visitor most forcibly that the instruction given to the students formed a strange contrast to the simplicity of their daily life. When Vehrli joined me, he was dressed like a peasant, but his eyes and face told of the intelligence which was presiding over this far-famed institution. The students were in the fields working like farm labourers, under the direction of scientific men. I afterwards saw them preparing the vegetables for the mid-day meal. These young men could nearly all play some musical instrument—the organ, pianoforte, or violin; they could nearly all sing from note, and all those who had been two years in the institution were admirably qualified to take the management of the primary schools.

Vehrli said, "In our college the students do everything for themselves. They clean their own chambers, brush their own boots, clean the knives, forks, and dishes, cultivate all the vegetables, prepare them to be cooked, and serve the meals. But, notwithstanding all this, they work in their class-rooms eight hours every day, and study the Scriptures, history, geography, arithmetic, mathematics, the elements of the sciences, music, and drawing." Close to the College there was a large village school, under the care of an experienced teacher. The students at the College, during their last year's residence, practised teaching in this school under the guidance of the teacher.

Within a few miles of the College were two large agricultural schools, founded and supported by this little canton, where the sons of the small farmers spend a few months every year to learn scientific farming and agricultural chemistry. They were under the management of scientific professors. Farms were attached to them. They were supplied with laboratories, the best agricultural implements, and books.

Throughout Switzerland, a good many of these agricultural schools have been established, in order to spread a knowledge of scientific and economic farming among the people.

But what I want to impress upon those who read this letter is, that the poor peasants and workmen of Switzerland have such a profound sense of the benefits which a good system of training and education bestows, that they do not grudge the great expense of carrying out and perfecting, as far as possible, the system of education which I have attempted so imperfectly to describe.

In Switzerland, it is the people who have most stringently enforced the laws which *compel* a parent to educate his children. It is the people who bear all the expense of assisting poor parents to do so. It is the people who provide the costly teachers' colleges, who build the schools, furnish them, maintain them, appoint the teachers, pay them, supply them with houses, and support them when superannuated. And so far are the people from murmuring at these regulations, that one of the principal efforts of the democratic governments of these little cantons is, how they shall further develope and perfect the institutions and laws, which have for their object the nurture and improvement of their children.

Do you wonder, then, when I tell you, that in several of the Protestant cantons, one in five, or one-fifth of the whole population, is actually under the care and education of the teachers? Every one in these cantons agrees that the good effects of the schools upon the moral and physical well-being of the people are most marked. The houses are steadily improving. The habits of the people are becoming more and more refined. The health of the younger generations is improving. All who live among them mark the change.

I believe that the workmen and peasants of Prussia, Saxony, and the Protestant cantons of Switzerland are in a better moral and social condition than the workmen and peasants of any other European country. And it is a fact, which I commend to the consideration of your readers, that during the last thirty years more has been done for the education and training of the children in these countries than in any other country in the world.

None are left neglected in the streets and gutters. All are trained up in the way they should go. And, certainly, the truth of the wise old saying is being exemplified in the case of these nations.

Fine Arts.

Portrait Miniatures.—Photographs from 200 of the most important of the miniatures exhibited in 1865 at the South Kensington Museum are now, under the sanction of the Science and Art Department, published by the Arundel Society. The complete set, with a copy of the official catalogue, bound in three volumes, half-morocco, is sold for ten guineas; a packet of twenty-five portraits, at choice, for one guinea; or a single photograph for one shilling. Specimens may be seen either at the South Kensington Museum, or at the rooms of the Arundel Society, 24, Old Bond-street.

National Portraits.—The exhibition of historic portraits, held last year at South Kensington, is put on permanent record by the art of photography. Out of 1,030 pictures exhibited, 964 have, with the consent of the owners, been photographed. The entire collection is issued by the Arundel Society, under the sanction of the Department of Science and Art, in ten volumes, half-bound in morocco, at the price of £62; or a single volume of 100 portraits, at choice, may be obtained for six guineas; or a packet of sixteen portraits for one guinea, or a single portrait for 1s. 6d. Specimens to be seen at Kensington or Old Bond-street. A new and corrected edition, with indexes, of the official catalogue of the late National Portrait Exhibition is announced, also a classified list of all photographs of drawings, paintings, and sculpture issued by the Department of Science and Art. This list, brought down to the present moment, will be of much use; a former catalogue has been out of print for some time.

Photographs of Pictures in the National Gallery.—Messrs. Caldesi have for some months been engaged on student-days in making photographs from leading pictures in the National Gallery. Upwards of three hundred plates have been pronounced satisfactory. It is thought that arrangements may be made for the publication of a complete work on the National Gallery,

consisting of a historic account of the painters, and a critical estimate of the pictures, illustrated by these photographs. The want of such a work has been long felt. Most of the national museums on the Continent have received elucidation in handsome and well-known volumes. Now that the National Gallery contains an epitome of most historic schools, a work which will worthily set forth its treasures would form a valuable contribution to art-literature.

Manufactures.

MANUFACTURES OF VENICE.—Till the end of the year 1847 there were upwards of one hundred different industries in a flourishing state. The glass manufacture alone produced yearly 800,000 kilogrammes of glass and crystal ware. The celebrated paper-mills produced upwards of 2,320,000 kilogrammes, and gave employment to 3,000 workmen. The salt marshes of the Lagoons produced more than 25,000,000 pounds of salt. Upwards of 260,000 pounds of the best wax candles were manufactured yearly. Extensive manufactures of painters' colours were carried on, and yearly furnished 470,000 pounds of white lead. The tobacco manufacture gave employment to 300 workmen and 600 women, and produced the enormous quantity of 23,000,000 lbs. only in cigars. The leather manufacture produced the best morocco, which was exported to the Levant; and in America upwards of 1,000 workmen were employed in the manufacture of gloves. In the arsenal a great number of ships were constructed, and the private shipbuilding yards alone employed 700 workmen. The manufacture of sail-cloth, fez of red cloth for the Levant, passementerie and lace, still maintained for Venice her ancient wealth. Even the ancient industry of masks for the Carnival produced upwards of 100,000 per year, which were exported throughout Italy, Germany, Switzerland, and as far as America. Exquisite articles of jewelry were still manufactured, amongst which may be remarked the little chains that derive their name from Venice, and gave employment to about 200 jewellers. From 1807 to 1847 a quantity of silver and gold, to the value of £6,440,000 sterling, was coined by the mint of Venice for the Levant. About 5,000 vessels yearly entered the port of Venice. The value of the exports by sea amounted to £5,720,000, and those by land to £2,800,000. Such was the commercial prosperity of Venice till the close of 1847. Twenty years are already passed, and Venice has with difficulty struggled on. It is to be hoped now that that she will rise again from her sleep, and become once more a great commercial centre.

Commerce.

SUGAR IN PERU.—In Peru, at the present time, the sugar cane is cultivated, and sugar refineries are established upon the best principles, if we may judge by the produce. The refineries furnish a white sugar, of fine quality, in small crystals. The flavour of it partakes more of the date than of the cane. If a like quantity of sugar could be produced on a scale of any magnitude, no doubt a large commerce would arise, although the great distance of the place of production might prevent this article of food from coming into European markets.

SALT WORKS IN FRANCE.—There are now numerous salt works on the French shore of La Manche. The most important working in these parts has been for some time past that of Bouteillas, near Dieppe; it was named in a charter at the end of the 17th century. Now, what remains of the salt marshes upon the French coast occupies a superficial total of 24,248 hectares, distributed over the coasts of the Manche, the ocean, and the Mediterranean. The cost price of the salt averages a franc for 100 kilogrammes.

KAOLIN.—Cornwall has for some years past done a large and profitable business in china clay, the greater part of which has been raised in the St. Austell district, where several important works are now in progress. There is every prospect, however, of a new district being opened up on an extensive scale in a short time. Fine samples of china clay have been discovered in three parishes, and the ground in various localities is believed to be very rich. Steps are being taken with a view to establish works which would afford employment to a large number of people.

Colonies.

COLONISATION OF VICTORIA.—A colonial journal says:—"It appears from the reports that have been made public lately, that the efforts of the Parliaments and Governments of Victoria, for some years past, have not been very successful in placing a race of yeomen on the soil, although heavy public losses have been endured for that end. None of the modes under which land has been offered to the public seem to have attracted settlers, in any number, who have really become settlers of the soil. Under the system of auction, which preceded that introduced by the Nicholson Act, considerable tracts of land were disposed of, but it was only in isolated districts here and there that the farmer put his hand to the plough. Magnificently-grassed lands, which would carry good crops of cereals under any ordinary course of farming, remain, year after year, in the same state, pretty to look at but not so charming as if fields of ripe yellow grain alternated with green crops and fallow fields. There were two causes for this state of things. The really good land in the colony, apart from that which may be found good, but is at present heavily covered with timber and almost impenetrable scrub, is too small to attract a numerous body of farmers, who might have worked together for their mutual good. Towns did not exist, except on the coast, or on new rushes in the gold field districts, to furnish markets for produce. The pastoral tenants were content with the natural bush roads, over which their bullock drays travelled easily enough under easy loads, and thus the farmer had no temptation in roads or markets to place land under cultivation, especially while the cheap and convenient highway of the sea enabled the farmers of South Australia and Tasmania to throw their produce into the markets of the gold fields. Scarcity and dearth of labour, uncertainty of seasons, and various other causes, assisted to discourage the farmer. The Amended Land Act has not been much more successful in attracting farmers. It is asserted, on what appears to be good evidence, that taking all the areas together thrown open for selection in and since June last, and they embrace about 4,000,000 acres, not more than a tenth part of the land has passed into the hands of *bonâ fide* farming settlers."

Obituary.

MR. GEORGE BAXTER, the inventor of oil-colour picture printing, died on Friday, the 11th January, from apoplexy, in his 62nd year. Mr. Baxter was a native of Lewes, and came to London forty years ago. He invented the process of oil-colour printing, and was in some repute as an artist. Among some of his works may be mentioned his miniatures of Her Majesty and the late Prince Consort, and a copy of the Descent from the Cross, from the original at Antwerp. He received the gold medal of Austria for his opening of the "First Par-

liament of Queen Victoria" and the "Coronation." His best original production is the miniature drawing of the Baptism of the Prince of Wales. Mr. Baxter was formerly a member of the Society of Arts.

Victor Cousin, whose philosophical works have occupied great attention during the last thirty years, died recently. He was the son of a Parisian watchmaker, and was entirely the architect of his own fortune. He filled for a considerable time the historical chair in the University of Paris, and was a member of two branches of the Institute, the Academy of Moral and Political Science, and the Academy of France. M. Cousin's library was celebrated, and estimated to be worth a million of francs; this is left by will to the Sorbonne. The intention of the deceased was known some time since, and in recognition of the fact, and as a tribute to his reputation, the government recently named a new street after him, Rue de Victor Cousin. M. Cousin resided at Cannes, where he died.

Mr. Joseph Guy, author of the well-known Spelling-book, and of various elementary educational works on history, geography, and various branches of science, died on Saturday, the 19th inst., at the age of 83.

Captain Huish, well known from his long connection with the London and North-Western Railway Company, died on Friday, the 18th inst. Captain Huish was deputy-chairman of the Electric and International Telegraph Company.

Notes.

The Orpheonists.—It appears from official reports that there are now in France 3,243 musical societies called orpheonists, consisting of 90,532 active members and 56,967 honorary members, altogether 147,499 persons. The greater part of these choral societies are under the direction of a professional teacher. The Departments du Nord and des Bouches-du-Rhône are those where the choral societies are the most numerous.

Storm Signals.—It appears that the underwriters, shipowners, and members of the mercantile marine service in Liverpool have expressed the greatest dissatisfaction with regard to the cessation of the storm warnings which were inaugurated by the late Admiral Fitzroy, and have adopted a memorial to the Board of Trade, asking that they may be re-established at once.

Russian Telegraphs.—The city of St. Petersburg will soon be provided with a telegraph which will convey the messages of the Government and those of private persons from all parts of the city, and even from some of the most frequented suburbs. Already the wires are laid, and the stations are now being organised; fourteen will be provided for the city and two for the environs. A message of twenty words will cost forty copecks; stamped sheets, on which the message can be written, and adhesive stamps, will be sold at all stations.

Miniature Coinage for the Island of Malta.—It appears by the *Engineer* that "a coinage of a very peculiar and curious character is at present in course of production at her Majesty's mint, consisting of minute pieces of money, each of which is intended to circulate among the inhabitants of Malta at the the nominal value of one-twelfth part of our English penny, or one-third of a farthing. Of these infinitesimal specimens of British mintage no less than half-a-ton weight, or a little over half-a-million of coins, have already received their impressions, and they will be speedily forwarded to their destination. Apart from their remarkably small size and value the new coins possess characteristics which make them interesting. For example, the portrait of the Queen, which forms the main ornamentation of the obverse, is said to be the most correct likeness of Her Majesty that has ever been transferred to metal discs. It is the result of a very recent sitting accorded to the artist, Mr. Leonard C. Wyon, who also engraved the die. The 'one-third farthing' is composed of metal analogous in its nature to that of which our own subordinate coinage is made, namely, a mixture of copper, tin, and zinc, in the respective proportions of ninety-five, three, and two parts in the hundred. This forms an exceedingly hard composition, well calculated to resist the wasting effects of attrition; and the pieces when newly struck have a rich, golden colour. The coins are five-eighths of an inch in diameter, and exceedingly thin. In fact, they might be termed metallic wafers, for it actually requires 480 of them to weigh down 1 lb. avoirdupois, and thirty of them to balance an ounce. In addition to the royal portrait, which is laureated and uncrowned, and which shows the hair plaited at the back—the obverse bears the legend, 'victoria d. g. britt. reg. f. d.,' within the engrailed edge, forming the frame of the picture, so to speak. The reverse represents a wreath composed of two sprays of the British oak, and between which, at their upper terminal points, is placed an imperial crown. Within the wreath, in straight lines, appear the words, 'One-third farthing,' and the date. The protecting rim, considering the paucity of material for raising it, is boldly developed, and thus the coin gains a finished appearance, contrasting favourably with the wire-edged pieces of money of far higher value and greater pretension. It is difficult to imagine, in these times of dear provisions and heavy rates and rentals at home, what articles the Maltese may be able to purchase for the 144th part of a shilling, but as figs, honey, oranges, and fish are abundant in the markets of Malta, perhaps some of these delicacies are obtainable at that homœopathic price. 'Change for a sovereign' in the new coinage would place the receiver in the possession of no less than 2,880 distinct pieces of hard cash. It remains only to be said that so far as minting operations are concerned in the execution of this especial coinage, they are both more numerous and more costly than those required in the production of sovereigns. Standard gold is far more ductile and 'kind' than bronze, and therefore more easily manipulated. Literally it costs less to make a sovereign than a Maltese wafer coin, notwithstanding the marvellous disparity in their respective values."

Correspondence.

Merchant Seamen.—Sir,—With reference to a proposal that was made at the discussion upon Capt. Toynbee's paper last Wednesday evening, that either another evening should be appointed to continue the discussion, or a committee formed to consider the state of the law with regard to merchant seamen, and as it may be inconvenient to fix another evening before the question is brought before Parliament, great good might be done were a committee formed to report to your council upon the subject. The point that struck me most at the discussion, and even in Capt. Toynbee's paper, was that the Merchant Shipping Act, which is very voluminous, appeared to be so little known. There is scarcely a point that was touched upon that it does not provide for, so that it is not an alteration in the law that is needed to effect all the improvement that is sought, but merely some changes in the mode of carrying out the provisions of the Act; and one clause permits the Board of Trade to make alterations and amendments even in the Act itself. I mention this for I fear that we should not readily get a better Act for the sailor if a new system of legislation is begun. It is from the Board of Trade and not from Parliament that most good can be got by proper representations. In the few observations I made (which are put down to the Rev. John Scott), I stated that the worst evil sailors had to contend with was that there was one particular spot appointed by Government at which

sailors receive their pay in London (irrespective of the sailors' homes), therefore the crimps and others are guided to their prey. The sailors are anxious that this should be done away with, and that they might receive their wages in the presence of a shipping master on board their ships. The Act admits of this, but it is never the practice; indeed the Act is most carefully framed for the good of the sailor, and yet for doing justice to the shipowner. I need not enter into further particulars, but, both as a member of your Society, and as one in constant communication with all classes of sailors, I shall be glad to be of any service to the committee if there is one formed. I may state that previous to taking holy orders, and undertaking the work here among sailors at the request of the bishop, I had many years' experience with ships and sailors as a partner in one of the oldest houses in China, where I was interested in many fine ships, and I have been both a shipowner and underwriter.—I am, &c., JOHN SCARTH.

Gravesend, Jan. 22, 1867.

MEETINGS FOR THE ENSUING WEEK.

MON.....R. Geographical, 8½. 1. The Hon. George Campbell, "A Geographical inquiry with reference to the best site for a Capital of India." 2. Mr. C. R. Markham, "On the Inland Navigation of Travancore."
Entomological, 7. Annual Meeting.
British Architects, 8.
Actuaries, 7. "On the real Rate of Mortality prevailing in England and Wales during the One Hundred Years from 1761 to 1861."
Medical, 8.
London Inst., 7. Prof. Ansted, "On the Present Aspect of Geology."

TUES ...Civil Engineers, 8. Discussion on "Ships of War."
Royal Inst., 3. Prof. Tyndall, "On Vibratory Motion, with special reference to Sound."

WED ...Society of Arts, 8. Report from the Judges on the Art-Workmanship Competition.

THUR ...Royal, 8½.
Antiquaries, 8½.
Philosophical Club, 6.
Royal Inst., 3. Prof. Tyndall, "On Vibratory Motion, with special reference to Sound."
London Inst., 7. Prof. Wanklyn, "On the Chemistry of the Noble Metals."

FRI .....Philological, 8.
Royal Inst., 8. Mr. J. Scott Russell, "On the Crystal Palace Fire."
Archæological Inst., 4.
R. United Service Inst., 3. Capt. R. C. Noake, "The Best Mode of Recruiting for the Army, and the Influences bearing upon that Service."

SAT .....R. Botanic, 3½.
R. Inst., 3. Mr. G. A. Macfarren, "On Harmony."

Patents.

From Commissioners of Patents' Journal, January 18th.

GRANTS OF PROVISIONAL PROTECTION.

Baths, &c., heating—3438—G. Shrewsbury.
Boots and shoes—3381—W. Clark.
Boots, &c., beading the uppers of—3343—W. Chapman.
Breech-loading fire-arms, and cartridges for—3425—F. J. Manceaux.
Button-hole sewing machines—8—G. B. Woodruff and G. Browning.
Carriages—3418—A. V. Newton.
Cartridges—24—G. Haseltine.
Chlorine—3411—H. B. Condy.
Clocks—3446—J. T. Griffin.
Cocks—3409—W. H. Cutler and T. Brown.
Coke and charcoal—3419—H. Chamberlain.
Combs—4—G. Stuart.
Corks—3341—W. Gilbey.
Culinary vessels—3427—E. B. Sampson.
Dredgers—3421—W. Simons and A. Brown.
Drying apparatus—3408—A. V. Newton.
Electricity, generating—3394—C. and S. A. Varley.
Electric telegraph posts, supports for—16—G. B. Smith.
Fabrics, folding—12—J. C. Ellison.
Fabrics, treating—3415—J. E. Brown.
Fibrous material, cleaning—3365—W. Rowan.
Fibrous substances, carding, &c.—3387—F. A. Calvert.
Flax, rippling—3444—C. D. Abel.
Fire-arms, breech-loading—28—P. Dagnall.
Fires, lighting—3347—W. Baker.
Glass, &c., cleaning—3423—W. B. Berrey.
Gossamer hat bodies—3353—S. Hall.
Grain, drying—3377—A. S. and H. H. Ayre.
Graining—3369—S. Jacobs.
Hydraulic power, applying—3395—J. B. Jordan and J. Darlington.
Hydrogen gas—3448—W. Clark.
Hydrostatic rotatory motive power engines—3431—B. W. A. Sleigh.
Locks and latches—3420—A. J. Adams.
Metallic boxes—3428—F. Leonardt.
Metallic hoops—3374—A. Shanks.
Metals, cutting—3410—F. Watkins.
Metals, shaping—3412—F. Watkins.
Mortar, mixing—3450—L. G. Speyser.
Motive power—3363—J. Anderson.
Motive power—3373—J. Sloper.
Oakum—3435—C. Sheridan.
Oxygen and chlorine, producing—3171—J. T. A. Mallet.
Paper-making machinery—30—E. N. Gregory.
Phosphate of lime, treating—3359—C. Norrington.
Planing machines—2—W. Muir.
Portable folding chairs—6—H. A. James.
Printing surfaces, &c., obtained by photography, producing—3393—R. H. Ashton.
Pulleys, &c.—3389—J. Rodgers.
Railway carriages, coupling—18—W. Chippindale.
Railways, actuating the points of—3413—W. Thomson.
Railways, electric signals for—3089—E. Funnell.
Railways—3434—W. Clark.
Railway wheels—3414—E. F. Göransson.
Refuse matters, treating—3401—W. Bradburn.
Saccharine liquors, boiling—22—W. Knaggs.
Ships' bottoms, coating—3355—A. V. Newton.
Soap—3432—G. Payne.
Steam boilers—3372—P. Heyns.
Steam boilers—3407—E. Storey.
Thermo-electric and magnetic apparatus—3351—J. Baker.
Traps—3345—D. A. Graham.
Valves—3405—W. Clark.
Valves—3424—C. Harrison.
Venetian blinds—3379—S. and J. Mitchell.
War ships, &c.—3357—C. Lungley.
Water tuyeres—3375—F. Northall and R. Turnley.
Window blinds, &c., raising—3366—G. Allix.
Yarns, sizing—3397—J. Fletcher and W. Carr.
Yarn, winding—3362—R. and S. S. Hall.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Hat bodies, felting—97—G. Haseltine.
Sewing machines—103—H. A. Bonneville.
Small arms—102—H. A. Bonneville.

PATENTS SEALED.

1882. S. Longbottom & T. Shaw.	1916. J. H. Johnson.
1884. F. Neidlinger.	1927. H. Prince.
1885. R. Irvine and P. Brash.	1930. J. and J. Hinks.
1891. H. Smith.	2012. W. Hartcliffe, jun., and T. H. Lee.
1895. W. Bellamy.	
1906. E. Leigh, H. T. Palmer, and W. E. Whitehead.	2026. W. E. Newton.
	2119. W. Clark.
1908. A. Kimball.	2123. W. E. Newton.
1915. G. Mountford and G. L. Loversidge.	2491. W. Clark.
	2653. E. M. Boxer.

From Commissioners of Patents' Journal, January 22nd.

PATENTS SEALED.

1918. W. B. Woodbury.	2298. J. Schneider.
1928. J. Strang.	2764. J. Fisher.
1929. J. Boeddinghaus.	2806. A. V. Newton.
1935. J. Vavasseur.	2900. G. Haseltine.
1948. W. Weldon.	3009. A. V. Newton.
1950. A. V. Mathieu.	3050. J. Howard & E. T. Bousfield.
1965. T. and J. Bibby.	3065. G. Haseltine.
2055. J. Clay.	

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

64. J. Coppard.	199. J. E. Dix.
111. W. Tongue.	222. W. Norton.
127. E. Lord.	148. J. D. Johin.
134. W. H. Marks.	151. J. Hamer.
211. T. Bradford.	156. J. Wilson.
245. S. Dixon and J. Calvert, jun.	158. G. E. Donisthorpe.
194. T. Bright.	165. J. Burch and S. Fearnley.
195. R. A. and E. Wright.	216. J. Stuttaford.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

147. G. H. and H. R. Cottam.	155. J. F. Belleville.

Registered Designs.

Handles for Bottles—January 7—4832—G. Ireland, Birchfield, near Birmingham.
Boxing Gloves—January 19—4833—Snoxell and Spencer, 35, Old-street, St. Luke's, E.C.
Moustache Protector—January 22—4834—A. Arculus, Birmingham.
Improved Elastic Band Holder—January 23—4835—G. Twigg, Mosley-street, Birmingham.

Journal of the Society of Arts.

FRIDAY, FEBRUARY 1, 1867.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'clock:—

February 6.—The following subject for discussion will be introduced by Mr. Henry Cole, C.B.:—"On the existing legal regulations in reference to the Cab Fares in the Metropolis, and their effect in rendering the Vehicles inferior to those provided in other European Capitals and the large Municipal Towns of this Country." On this evening Sir Richard Mayne, K.C.B., Chief Commissioner of the Metropolitan Police, will preside.

February 13.—"On Artificial Illumination." By D. N. Defries, Esq.

February 20.—"On the Water Supply of London as it affects the Interests of the Consumers." By Thomas Beggs, Esq.

Cantor Lectures.

A course of Six Lectures "On Pottery and Porcelain," illustrated by specimens of various manufactures, and by photographs and diagrams, is now being delivered by William Chaffers, Esq.

Lecture III.—Monday, February 4.

Fayence.—France, Spain, Portugal, Russia, Sweden, Denmark, &c.
Grès or Stone Ware of Germany and Flanders.
Delft Ware, &c.

Lecture IV.—Monday, February 11.

Oriental Porcelain.—China, Japan.

Lecture V.—Monday, February 18.

European Porcelain.—Italy, Germany, France, Holland, Belgium, Russia, Poland, &c.

Lecture VI.—Monday, February 25.

English Pottery and Porcelain.—Early History, continued to the beginning of the 19th century.

The lectures commence each evening at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend to each lecture. Tickets for this purpose have been issued to each member.

Art-Workmanship and Educational Prizes.

The Court of the Worshipful Company of Goldsmiths have passed the following resolution:—

"That the sum of £25 be given to the Society for the Encouragement of Arts, Manufactures, and Commerce; £15 thereof to be applied by the said Society as a prize, or prizes, for the encouragement of workmen in the precious metals, and £10 to be applied as prizes of £5, £3, and £2 respectively, to be awarded, at the Society's Educational Examinations, to the three candidates who, being employed on works in the precious metals in any part of the United Kingdom, shall obtain from the examiners the first, second, and next highest number of marks, such prizes to be distinguished in each case as "The Goldsmiths' Company's Prizes."

It will be remembered that donations for similar objects have been received in this and in former years from the Worshipful Companies of Salters, Plasterers, Coach and Coach Harness-makers, and Clothworkers; and the Council are gratified by this further proof of the desire of these important Guilds to co-operate with the Society in its efforts to encourage Art-Workmanship and general Education.

The above Educational Prizes are offered to candidates at the Society's Examinations, to be held in April next (see below); the Art-Workmanship Prizes to competitors in the next Art-Workmanship Competition, particulars of which will be duly announced.

Examinations, 1867.

In addition to the prizes announced in the Programme of Examinations, the following are offered:—

The Worshipful Company of Coach and Coach Harness Makers offer a prize of £3 in Freehand Drawing, and a prize of £2 in Practical Mechanics, to the candidates who, being employed in the coachmaking trade, obtain the highest number of marks, with a certificate, in those subjects respectively.

The Worshipful Company of Goldsmiths offer three prizes—of £5, £3, and £2 respectively—to the three candidates who, being employed on works in the precious metals in any part of the United Kingdom, shall obtain from the examiners the first, second, and next highest number of marks, such prizes to be distinguished as the "Goldsmiths' Company's Prizes."

Art-Workmanship Prizes.

The works sent in competition for these Prizes are now placed in the Society's Great Room for the inspection of members and their friends.

Subscriptions.

The Christmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Ratisbon Cathedral.

M. Schubarth, a corresponding member of the Society, has forwarded to the Secretary an interesting series of Photographs, illustrating the progress of the restoration of Ratisbon Cathedral.* He writes as follows:—

Ratisbon, Bavaria, 31st December, 1866.

Sir,—Feeling extremely thankful for the great kindness which the Society of Arts has shown me by sending

* See page 166.

me every week, since 1851, a copy of its *Journal*, I have always regretted not to have had it in my power to be serviceable to the Society. All that I have been able to do is to forward the *Journal* to some friends of mine, and to direct their attention to its very valuable and interesting contents, which were always appreciated by them. It has occurred to me that perhaps it would not be uninteresting to some members of the Society to receive some information concerning an important work, which, some years ago, was undertaken in this town of Ratisbon, namely, the restoration, or rather the completion, of the old cathedral. I take the liberty of forwarding to you, by a friend of mine, a parcel containing several photographs, representing the Ratisbon Cathedral in its former state, and the progress made from year to year in completing the building, especially the towers. I enclose some particulars of the cathedral, and a description, made by the present architect himself, of what has been done by him up to this time. For the convenience of those who are not familiar with the German language, in which this description is written, I have attempted to translate it into English, and I hope that the translation, though destitute of elegance, will at least be intelligible. I conclude, sir, by requesting you will have the kindness to present to the Society of Arts these objects, as a token of my gratitude for the favours shown to me.—I am, &c., B. F. Schubarth, Councillor of Commerce, Commissioner for Bavaria at the Great Exhibition of 1851.

The Photographs referred to are now at the Society's house for the inspection of members.

Proceedings of the Society.

Cantor Lectures.

"On Pottery and Porcelain." By W. Chaffers, Esq.

Lecture II.—Monday, January 28.

The subject of Mr. Chaffers' second lecture was the maiolica work of Persia, Spain, and Italy, and it was amply illustrated by specimens of all the principal manufactures, kindly lent to the lecturer for the purpose by Mr. J. Henderson, Mr. F. Slade, Dr. Diamond, Mr. H. G. Bohn, and Mr. Durrant. The marks and monograms used by the various potters and ceramic artists of Italy in the 16th and 17th centuries were arranged on the walls. The lecture was opened by a short history of maiolica in general, and its leading characteristic, the stanniferous enamel glaze, was fully described. This distinguishing feature is a covering of a thick, opaque, white glaze, resulting from the introduction of the oxide of tin, which, from the dissemination of its particles, imbedded, uncombined, amid the glass, renders the substance opaque, and not only covers the dingy colour of the clay, but forms a fine colourless ground for the painter. All the manufactured pieces of pottery, after the first baking, were covered wholly or partially with this glaze, diluted, so that the water was absorbed by the biscuit, leaving the enamel in a state of powder on the surface; on this crude and gritty medium the painting was applied, and was necessarily produced by single strokes of the brush, no corrections being possible. It was then placed in the kiln again, to melt the glaze and fix the colours. The metallic lustre colours found especially upon the pieces painted at Gubbio were next described. Mr. Chaffers, in speaking of the Hispano-Moorish period, commencing from the 13th century, when the Alhambra was erected by the Moors, gave a history of the celebrated vase of the Alhambra, the finest specimen of Moorish fayence known, made probably at Malaga, early in the 14th century. Three vases full of treasure were discovered at Adarves, in Spain, by the Marquis de Mondejar, in the 16th century. With the gold found in them he laid out a garden on the spot in which the vases were placed; but, being exposed to public view unprotected, they sustained considerable injury by being rubbed and handled, and eventually one got broken; henceforth every traveller who visited the garden took away a fragment as a memento, until all of it was gone. In 1785, two were yet preserved intact; but about the year 1820 a second disappeared altogether, and of three only one is extant. It measures 4 feet 7 inches in height. The colours of the decoration are a pure blue enamel, surrounded by a yellow lustre on white ground, ornamented with scrolls and Arabic inscriptions, with two antelopes in the centre. The pottery of Maiorca—from which place the term maiolica was derived—Valencia, Malaga, Manises, and and other Spanish *fabriques*, came next under review. The richly-enamelled ware of Persia was then described, and reference was made to its early origin, from the fact of many plaques and discs being found, decorating churches in Italy which were built in the 12th and 13th centuries. Faenza, the best known and most celebrated for its productions, gave to France the name by which they have to the present day distinguished their enamelled pottery, as Maiorca in Spain did to Italy, and Delft in Holland to England. The favourite decoration in the 16th century was arabesques and grotesques in blue camaieu on yellow ground, or *vice versâ*; the reverses of the plates having concentric circles, or spiral lines in blue, or zones of blue and yellow. Caffagiolo, established towards the end of the 15th century, produced maiolica of a very artistic character, and many valuable examples have been preserved to our time. The most ancient dated pieces are in the collection of Baron Gustave de Rothschild, 1507 and 1509; the latest date is 1590. A great peculiarity of this ware is the deep blue back ground on many of the specimens. Some well known plates of this *fabrique* are in the South Kensington Museum, as the Maiolica Painter in his Studio; a portrait of Pietro Perugino; a Procession of Leo X., composed of more than fifty figures; the St. George of Donatello, &c. To these succeeded Forli, Rimini, Viterbo, Ravenna, Travisio, Pisa, and other manufactories of secondary importance. Siena was an important *fabrique*, and many highly-finished enamelled tiles still remain *in situ* in the Church of San Francisco, and the Biblioteca, and the Petrucci palace supplied the South Kensington Museum with several hundred examples, some dated as early as 1509. The manufacture was continued during the 18th century. The Pesaro maiolica is generally known by a yellow lustre and blue ground, with imbricated borders, many having portraits of ladies and gentlemen, their names inscribed on scrolls—but there are many other varieties. Castel Durante was a very extensive manufactory; a large trade was carried on in drug vases. Being adjacent to Urbino, many of its productions are similar and often ascribed to that *fabrique*. In 1635 the name was changed to Urbania, in compliment to Pope Urban VIII. The Chevalier Piccol Passo, director of a bottega at Castel Durante about 1550, wrote a treatise on the art of making and decorating maiolica. This manuscript is preserved in the art library of the South Kensington Museum, and is a most interesting work, being illustrated with pen-and-ink sketches of all the details of manufacture, patterns of the ware, and the prices at which they could be obtained; the names of the principal forms of the vessels are given, and contemporary *fabriques* frequently alluded to. Urbino was the most celebrated of all the Italian manufactories, and many of the names of the artists are well known from their signatures on the pieces they decorated. The most noted is Francesco Xanto Avelli da Rovigo, who usually painted after the designs of Raffaelle and other great masters, seldom, however, adhering strictly to the grouping of the originals. He also painted subjects from Virgil, Ovid, Ariosto, and other poets. On many of his pieces are found touches of the rich ruby and gold metallic lustres, which were evidently applied after the vessel had been painted and baked at Urbino; it was then sent to

Gubbio to be lustred, where the process was kept profoundly secret. Another celebrated ceramic artist of Urbino was Orazio Fontana, whose best works were referred to by the lecturer. The family of Patanazzi also, some of them painted maiolica at the early age of twelve. Gubbio is known to us especially by the works of Maestro Giorgio, who seems to have monopolised the rich ruby and yellow lustres. Mr. Chaffers exemplified the value which is attached to the rare productions of this artist, by quoting the high prices many of them have realised. A plate, painted with the Three Graces, was sold for 400 guineas, and many others were cited. The *fabriques* of Deruta, Ferrara, Turin, and Venice, in the 15th century, and those of a later period in the 16th and 17th centuries, as Savona, Genoa, and Castelli, were next described and their peculiarities pointed out.

In conclusion, Mr. Chaffers spoke of the Santa Casa at Loreto, where there are still preserved upwards of 350 maiolica vases, brought from the Spezieria, or Medical Dispensary, attached to the palace of Urbino. The last Duke of Urbino, Francesco Maria II., in his dotage had abdicated in favour of the Holy See, and at his death, in 1631, his heir Ferdinand de Medici removed the more ornamental pieces to Florence. The vessels from the Spezieria he presented to the shrine of our Lady of Loreto; these did not consist alone of drug vases, but among them were many choice pieces and some statuettes, which became the envy of more than one of the crowned heads of Europe. A curious piece of maiolica, inscribed with the words *Con polveri di Santa Casa*, Mr. Chaffers explained as having been made within the precints of the sanctuary, with the dust shaken from the dress of the virgin and swept off the walls, mixed with clay and formed into cups or bowls, painted with the virgin and child and a view of the Santa Casa, and in this form preserved by the faithful as tokens of their visit to the shrine.

Eighth Ordinary Meeting.

Wednesday, January 30th, 1867; Sir Thomas Phillips, Q.C., F.G.S., Chairman of the Council, in the chair.

The following candidates were proposed for election as members of the Society:—

Atkins, Francis Henry, 62, Fleet-street, E.C.
Barlow, James, Greenthorn, near Bolton.
Burgess, A. W., 107, Strand, W.C.
Chaffer, Thomas, 14, Great Howard-street, Liverpool.
Greenwood, Thomas, 28, Waterloo-road, Cheetham, Manchester.
Hayes, Henry, 31, College-green, Dublin.
Richardson, William, Hartford Works, Oldham.
Whitehead, Peter Ormerod, Rawtenstall.

The following candidates were balloted for, and duly elected members of the Society:—

Agnew, William, Manchester.
Angier, Samuel Haynes, 72, Cornhill, E.C.
Baragwanath, J. P., 153, Upper Thames-street, E.C.
Bingham, Reuben, 1, John-street, St. James's-sq., S.W.
Bonnor, George, F.R.G.S., 42, Queen's-gate-terrace, Kensington, W.
Bradfield, J. E., 2, Strand, W.C.
Chaffers, William, 19, Fitzroy-square, W.
Gard, Richard Sommers, Rougemont, Exeter.
Lobley, James Logan, F.G.S., 50, Lansdowne-road, Kensington-park, W.
Lubbock, Sir John, Bart., F.R.S., 15, Lombard-street, E.C., and High-elms, Farnborough, Kent.
Middleton, Thomas John, 79, Long-acre, W.C.
Muspratt, Edmund K., New-hall, 41, Old Hall-street, Liverpool.
Ommanney, Rear-Admiral Erasmus, F.R.G.S., F.R.A.S., 6, Talbot-square, Hyde-park, W., and United Service Club, Pall-mall, S.W.
Paine, Thomas, Banbury.
Pearce, J. D. M., A.M., Craufurd College, Maidenhead.
Ramsden, J. C., Busbridge-hall, Godalming.
Seaton, John Louis, 93 and 95, Hampstead-road, N.W.
Shaw, James Jesse, 2, Hill-road, St. John's-wood, N.W.
Somerton, The Viscount, Roche-court, Salisbury.
Thomson, John Reid, 18, Highbury-place, N.
Ward, John, 107, London-wall, E.C.

The Secretary then read the following—

REPORT OF THE JUDGES ON THE ART-WORKMANSHIP COMPETITION.

To the Chairman and Council of the Society of Arts.

January, 1867.

Gentlemen,—It is very gratifying to be enabled to recognise that the culture directed by your Society to the improvement of the Art-workman in so many departments of skilled industry, is at length bearing good fruit. Both in quantity and quality, the objects now exhibited in competition for your valuable prizes, surpass those contributed in any previous year. The most marked progress is shown in the class of hand-wrought metal work, more especially in iron. To two Art-workmen in this class—Mr. G. Page, of Clerkenwell, and Mr. W. Letheren, of Cheltenham—we have without hesitation awarded your prizes of £10 each; to the former for a reproduction of the celebrated Martelli bronze mirror case, in sheet iron, *repoussé;* and to the latter for an excellent panel for a screen, a specimen emulating the fine old smith's work of the fifteenth century. To the former we would also recommend should be given the special prize, known as "the North London Exhibition Prize," he having produced the object which we consider manifests in the highest class the most skilled workmanship in the whole display. In Mr. Page's case we reward not only excellence but novelty, since we have not heretofore observed any such indication of power on the part of an English Art-workman to compete with what has been hitherto almost exclusively produced in this most difficult branch of industry in France and Spain.

After dwelling upon the admirable work shown in the intractable metals, iron and brass, it would be unfair to pass in silence over two specimens of carving in wood, which possess remarkable merit, viz., the picture-frame, produced by various highly-skilled workmen, under Mr. J. H. Wyatt, of Dean-street, Soho, and the head of "Autumn," in satin-wood, by Mr. G. F. Bridge, of Westminster. The former is no less excellent as a specimen of gilding than of wood-carving; and the latter, though small, is still sufficient to display the rare dexterity of the artist.

There is one peculiarity of this Exhibition as compared with those of former years, viz., the liberty given to artisans to exhibit works after other designs than those prescribed in the classes enumerated in the first section of the programme. Many have availed themselves of this relaxation in the conditions, and highly creditable works have been sent in, of which Mr. Letheren's panel for a screen above alluded to, is the best. It is to be hoped that the promise held out by the merits of many of the objects shown this year in this section may mature in future years into an exhibition of powers of meritorious origination as well as of perfect workmanship. The Society is to be specially congratulated upon the institution of this section, and upon the results of its action in this respect.

While upon this subject, we would submit the propriety of changing the models given to the competitors, if not every year, at least more frequently than has been the practice heretofore. Any such frequent variation would stimulate the Art-workmen to fresh exertions,

would prevent the apparent monotony in the Exhibitions from season to season, and would certainly relieve the labours of the adjudicators, who are frequently apprehensive of rewarding in one year the very same object that had been eclipsed by higher competitors in a previous year.

Finally, we would willingly offer our congratulations on the successful character of the present exhibition, not only to the Society of Arts, but to the body of Art-workmen; whose contributions this year testify a rapid advance in effecting, what we trust may prove, a permanent alliance between beauty and propriety of design on the one hand, and admirable technical execution on the other.

(Signed) Rich. Redgrave, M. Digby Wyatt, } Adjudicators.

The following is a list of the works, with the prizes awarded :—

FIRST DIVISION.

Works generally Executed from Prescribed Designs.*

1. Carving in Stone.—Panel, after chimney piece by *Donatello*, by J. Daymond, Jun., 4, Edward-street, Vauxhall-bridge-road, S. Price £8.—(2nd *Prize* of £7 10s.)
2. Ditto, Gothic bracket, by E. J. Price £5.—(*Prize* of £4.)
3. Ditto, by John Edward Daly, 33, Medway-street, Westminster, S.W. Price £15.—(*Prize* of £3.)
4. Ditto, by John Barker, 4, John-street, Marlborough-road, Chelsea, S.W. Price £12.—(*Prize* of £6.)

*5. Flowers carved in Caen stone, by W. H. Holmes, 101, Dean-street, Soho, W. Price £5.—(*Prize* of £5.)

*6. Carving in Marble.—"Ecce Homo," by J. P. F. Jones, 4, Surrey-villas, Nunhead-green, Peckham Rye, S.E. Copies made for £5.

*7. Basso relievo, in marble, representing the Arts and Sciences, by the above. Price when finished £20.

*8. Ditto, in marble, "Triumph of Christ," by Owen Thomas, 66, Harmood-street, Camden-town, N.W. Price £25.—(*Prize* of £5.)

*9. Carving in Stone.—"Christ blessing little Children," by H. Francis, Reigate-heath, Surrey.

*10. Ditto, "First Steps in Life," by the above.

*11. Ditto, specimens of letter-cutting in stone, by the above.

*12. Modelling in Plaster.—National emblems, arranged by J. Daymond, Jun., 4, Edward-street, Vauxhall-bridge-road, S. Price £8.

*13. Head in Caen Stone.—"Winter," by T. Herne, 22, Werrington-street, Oakley-square, N.W.

14. Carving in Wood, after design by *Holbein*, by T. E. Mayle, 33, James-street, Stockwell, S.

*14*a*. Carving and Gilding.—A Glass Frame, designed and carved by W. M. Holmes, principal part of the Flowers by Mouatt (deceased), gilt in double mat and burnished by Messrs. Buchholtz, Venning, Chowne, sen., Ettershank, Connor, and Allen; exhibited by J. H. Wyatt, 101, Dean-street, W. Price £230.—(*Prize* of £10.)

15. Repoussé Work in Metal.—Executed in iron, after the Martelli bronze mirror case at South Kensington, by G. Page, 39, Duglas-street, Northampton-road, Clerkenwell, E.C. Price £20.—(1st *Prize* of £10; also, North London Exhibition *Prize*.†)

16. Ditto, by J. S. Nichols, 4, Everilda-street, Hemingford-road, Islington, N. Price £5.

16*a*. Ditto, on silver cup, by X. Y. Z. Price £30.

17. Ditto, on silver, by V. U. (Unfinished.)

18. Ditto, "Raphael's Three Graces," in silver, by Joseph Hakowski, 59, Frith-street, Soho-square, W. Price £20. Copies at £15.—(*Prize* of £2.)

18*a*. Ditto, "Three Graces," in silver, by X. Y. Z. Price £12.

19. Ditto, "Three Graces," in copper, silvered, by Charles Yerman, 14, Gerrard-street, Islington, N.

20. Ditto, "Three Graces," in copper, by Alexander Dufour, 36, Cleveland-street, Fitzroy-square, W. Price £11.—(*Prize* of £4.)

21. Ditto, "Three Graces," in copper, by W. Holliday, 14, Nailour-street, Islington, N. Price £15.

*22. Ditto, Portrait of the late Viscount Palmerston, by the above. (Sold.)—(*Prize* of £4.)

*23. Ditto, Group, in copper, "Abundance," after *J. Van Eycken*, by Thomas James Bowman, 3, Rheidol-terrace, St. Peter's, Islington, N. Price £7 10s.

*23*a*. Ditto, "Raffle-leafage." Price £5.

24. Hammered Work in Brass.—Adapted for use as a bracket, by W. Mansfield, 72, Bishop's-road, Camberwell New-road, S.

25. Ditto, by E. Millward, 35, Little Clarendon-street, Somers-town, N.W.

26. Ditto, by Albert Edward Millward, 13, New Compton-street, Soho, W.—(*Prize* of £6.)

27. Hammered Work in Iron.—Ditto, by Alfred Millward, 35, Little Clarendon-street, Somer's-town, N.W.—(*Prize* of £3.)

28. Ditto, by G. H. Price £5 10s.—(*Prize* of £2.)

29. Ditto, by James Gwillim, 19, Sidney-square, Mile-end, E. Price £15.—(*Prize* of £2.)

*30. Ditto, by the above. Price £20.

30*a*. Ditto, Panel for a screen, by W. Letheren, Lansdown Iron Works, Cheltenham. Price £20.—(*Prize* of £10.)

*31. Ditto, by William Cunliffe, St. Peter's-street, Burnley. Price £5 5s.

*32. Ditto, Bread-basket, designed by A. W. Blomfield, Esq., architect, for East Sheen Church; executed by T. Winstanley, 7, Stanhope-street, Clare-market, W.C. Price £12.—(*Prize* of £2.)

33. Carving in Ivory.—Medallion portrait of Flaxman, by J. W. Bentley, 22, Sherwood-street, Golden-square, W. Price £10.

34. Chasing in Bronze.—Bust of "Clytie," by Frederick Beech, 52, Great Colmore-street, Birmingham. Price £16 16s.

35. Ditto, by H. R. Batchelor, Jun., 149, St. John-street-road, E.C. Price £14.—(*Prize* of £4.)

36. Ditto, by T. Nichols, 4, Everilda-street, Hemingford-road, Islington, N. Price £15.—(*Prize* of £6.)

37. Ditto, Ornament, after *Goutier*, by R. Reynolds, 15, Oak-village, Kentish-town, N.W. Price £15.—(*Prize* of £2.)

38. Ditto, Ornament, after *Goutier*, by G.—(*Prize* of £2.)

39. Ditto, Ornament, after *Goutier*, by H. J. Hatfield, 16, Alfred-street, Tottenham-court-road, W.C. Price £15.—(*Prize* of £4.)

*40. Ditto, Group, "Jacob Wrestling with the Angel," by the above.—(*Prize* of £3.)

*41. Two miniature frames, raised and chased by the above.

*42. Ditto, Statuette of "Caractacus," by H. Hatfield, sen., 46, Bolsover-street, N.W. Produced for the Art Union of London.—(*Prize* of £5.)

43. Engraving on Metal, after arabesques, by G. S. B. Price £3 10s.—(*Prize* of £2.)

44. Ditto, by G. Berry, 31, Brewer-street, Golden-square, W. Price £4 4s.—(*Prize* of £5.)

45. Ditto, by William Rowe, 4, Larkhall-lane, Clapham, S. Price £3.

* Those marked with an asterisk (*) are not after the prescribed designs.

† This Prize consists of the interest of £167 7s. 3d. Consols, invested in the name of the Society of Arts, to be awarded by the Council "for the best specimen of skilled workmanship" at the Society's Exhibition.

*46. Ditto, by Gilles McKenzie, Tudor-street, Sheffield.
*47. Ditto, by the above.
*48. Ditto, by the above.
*49. Ditto, on silver cup, by the above.—(*Prize* of £2.)

*50. Enamel Painting on Copper.—"Madonna and Fish," after *Raphael*, by Frederick Lowe, 13, Wilderness-row, E.C.

*51. Ditto, "Boy and Doves," after *Raphael*, by Walter J. W. Nunn, 10, Gardour-street, Bromehead-street, Commercial-road, E. Price £5.—(*Prize* of £3.)

52. Painting on Porcelain.—"Two Children," in *Raphael's* cartoon of "Lystra," painted on a vase, by Edwin Saunders, apprentice. Exhibited by Messrs. Battam and Son, Gough-square, E.C.

53. Ditto, "Two Children," painted on a vase, by W. J. W. Nunn. Exhibited by Messrs. Battam and Son, Gough-square, E.C.—(*Prize* of £2.)

54. Ditto, "Two Children," by F. D. Bradley, West-parade, Mount-pleasant, Stoke-upon-Trent. Price £4 4s.

55. Ditto, "Two Children," by John Slater, Field-place, Stoke-upon-Trent. Price £3 3s.

56. Ditto, "Two Children," by William Slater, Field-place, Stoke-upon-Trent. Price £3 10s.

57. Ditto, "Two Children," by William H. Slater, Oak-hill-cottages, Stoke-upon-Trent. Price £5 10s.—(*Prize* of £2.)

58. Ditto, ornament, by F. D. Bradley, West-parade, Mount-pleasant, Stoke-upon-Trent. Price £5 5s.

59. Ditto, Ornament, by Alexander Fisher, 5, Clyde-street, Stoke-upon-Trent.—(*Prize* of £3.)

*60. Ditto, Ornament, plateau in blue, after design by *Maestro Ludovico*, by the above.—(*Prize* of £3.)

*61. Ditto, Pair of door finger-plates, majolica style, by Miss L. Leila Hawkins. Price £5 5s.—(*Prize* of £2.)

*62 & 63. Ditto, Circular-plates, subjects from the "Signatura" ceiling, by W. P. Rhodes, School of Arts, Stoke-upon-Trent.—(*Prize* of £2.)

64. Decorative Painting, Ornament, by John Slater, Field-place, Stoke-upon-Trent. Price £3 3s.—(*Prize* of £4.)

65. Ditto, by Δ.

66. Ditto, by Charles Pfänder, 28, Bayham-street, Camden-town, N.W. Price £6 5s.—(*Prize* of £2.)

67. Ditto, after a picture frame in the South Kensington Museum, by the above, £13 10s.—(*Prize* of £4.)

68. Wall Mosaics, after *Bertini* of Milan, by Samuel Cooper, 2, Waterford-terrace North, Walham-green, W.

69. Die Sinking, after *Wyon's* "Head of Prince Consort," by W. E. Bartelle, 4, Chichester-place, Wandsworth-road, S. Price £15.

70. Ditto, by J. W. Minton, 9, Royal Mint, E.C. Price £20.

71. Ditto, by Albert Henoss, 3, Egbert-street, St. George's-road, N.W. Price £10 10s.—(*Prize* of £2.)

72 Glass-blowing.—Exhibited by Dr. Salviati, 431, Oxford-street, W. Produced by Marco Seguso, of Murano.—(*Highly commended, but ineligible for a Prize, not having been produced in this country.*)

73. Bookbinding.—After an Italian specimen, "Quintus Curtius," by John Jeffrey, 23, Upper Marylebone-street, W. Price £7.—(*Highly commended, but ineligible for a Prize this year, the producer having taken the 1st Prize last year.*)

*74. Ditto, Early Florentine style, "Histoire de la Porcelaine," by Louis Genth, 30, Brydges-street, Covent-garden, W.C. Price £35.—(*Prize* of £5.)

*75. Ditto, "Œuvres de Lorize Labe," by the above. Price £8 8s.

*76. Ditto, case specimen of Mosaic, by the above, £10 10s.—(*Prize* of £3.)

77. Illuminations.—Specimen by Charles Pfänder, 28, Bayham-street, Camden-town, N.W. Price £5 10s.—(*Prize* of £4.)

78. Ditto, by Miss Mary R. David, 4, Anderson-street, Chelsea, S.W. Price £5 5s.

SECOND DIVISION.

Works Executed without Prescribed Designs.

Wood Carving.—(*a.*) *Human figure in the round, in alto or in bas relief. Animals or natural foliage may be used as accessories.*

79. "Egeria," by J. W. Gould, 33, Bayham-place, Camden-town, N.W. Price £15.

80. "Cynthia," by the above. Price £10.

81. "Autumn," Female Head in satin wood, by G. F. Bridge, 3, Vincent-square, S.W. Price £5 10s.—(*Prize* of £5.)

82. A Finial carved in oak, by R. Davison, 28, Winchester-street, South Belgravia, S.W.

83. Original Group in walnut, "Wallace at the Battle of Stirling," by John Lucas, 82, Long-acre, W.C. Price £31 10s.

83*a*. Panel, in Ebony, "Boy and Moth," by R. Flipping, 67, Charrington-street, Oakley-square, N.W.—(*Prize* of £2.)

(*b.*) *Animal or still-life. Fruit, flowers, or natural foliage may be used as accessories.*

84. "Dog's Head," by E. Dujardin, 46, Camberwell-grove, S. Price £2.

85. Panel. "Bird and Flowers," by the above. Price £10.—(*Prize* of £2.)

(*c.*) *Natural foliage, fruit, or flowers, or conventional ornament, in which grotesque figures or animals may form accessories, preference being given where the work is of an applied character for ordinary decorative purposes, as representing commercial value.*

86. Panel in Lime Wood, by J. S. Booth, 19, Malden-road, Kentish-town, N.W. Price £10 10s.—(*Prize* of £4.)

87. Chimæra Truss Leg, by R. Baker, Messrs. Holland and Sons, Gillingham-street, Pimlico, S.W.

88. Vase of Flowers and Conventional Bracket, by G. H. Bull, 16, Millman-mews, Millman-street, W.C. Price £23.

88*a*. Panel of Flowers, exhibited by Messrs. Gillows and Co., carved by R. A. Brangan, 54, Foley-street, W.—(*Prize* of £3.)

89 & 90. Design for Damask Table Linen, by Miss A. Kemp, 27, Hereford-square, Brompton, S.W. Price of No. 89, 15s.; No. 90, 10s.

91. Design for a Book Cover, by Miss Mary R. David, Price £1 10s.

92 & 93. Designs for Damask Table Linen, by the above. Price 10s. each.

94 & 95. Works in Oil, by Charles Maiben, 40, West Hill-street, Brighton.

(*The above are not eligible for Prizes.*)

Works Executed and Finished by Machine.

Exhibited by Charles J. Hill, 6, Albany-street, Regent's-park, N.W.:—

96—98. Three Groups in Ivory. Price £15.

99. "Head of H.M. the Queen," in Ivory. Price £5.

100. "Greek Head" in Steel. Price £8.

101. Ditto, in Malachite. Price £5.

102. Case with Two Proofs from Engravings on Steel for Surface Printing, and two "Medusa's Heads." Engravings and dies in hand. Price £4 each.

(*The above are highly commended, but are ineligible for these Prizes.*)

The Secretary read a letter from Mr. Digby Wyatt, expressing his great regret that he was prevented by illness from attending the meeting that evening. A letter from three workmen was then read, stating that the piece of *repoussé* work in iron (No. 15), produced by Mr. Page, to whom the first prize had been awarded, was "not embossed from the flat, but struck in a cast die obtained from the plaster cast issued by the Society." The Secretary said he had thought it right to make inquiry into the matter, and had been informed by Mr. Page that this was not the case.

Mr. J. S. Nichols suggested that the work might have been struck in a die and finished off afterwards, but that could not be regarded as *repoussé* work, which meant embossing from the flat.

The Chairman suggested that Mr. Page, who was present, should give any explanation he thought proper.

Mr. Page begged to state that the parties by whom the exception had been taken were under a false impression in supposing that the work had been struck from a die; but he had no objection to explain to his fellow-workmen the plan on which he proceeded. The manner in which the metal was "got up" was this:—In the first instance he soldered the plate upon a piece of block tin. Having explained what he considered the advantages of this plan, Mr. Page said that, as to the work having been struck in an iron die, those who entertained that idea could have little conception of the cost of producing such a die; and it must be further considered that to strike iron into such a die would be an extremely difficult task.

Mr. Campin remarked that the prize having been offered for *repoussé* work, he considered that if the work sent in had been struck in a die it was not *repoussé* work, ordinarily so called, and he thought the question should be definitely settled.

The Chairman said it seemed to him to be a question of fact. The most proper and convenient course under the circumstances would be that the judges should hear the objections on the one side, and Mr. Page's explanation on the other, and decide whether, under the conditions of the competition, he was entitled to the prize or not.

Mr. Page expressed his perfect concurrence with this suggestion.

The Chairman said although the cheques for the prizes would not be delivered to the successful competitors that evening, he was sure those present would be gratified by having an opportunity of personally recognising such of them as were present; he would therefore invite those prizemen who were present to come forward.

This request having been complied with,

The Chairman said it was gratifying to find that the appeal made by the Society had received so satisfactory a response; because undoubtedly the competitors had shown that English workmen of the present day were not inferior to those of other countries, or inferior, at least in many respects, to the workmen of our own country in past times. It appeared to him that the competitors generally, and especially those who had been successful in obtaining prizes, had creditably maintained the high character of their own class by the works they had produced—works which, although in most cases they were merely reproductions of splendid examples of the taste and skill of former times, were, he might venture to say, scarcely inferior to them in excellence. It was certainly most gratifying to the Society of Arts, which had now for several years endeavoured to stimulate the art-workmen of England, to find that they had among them men whose taste, knowledge of colour and of form, and skill in execution, had enabled them to produce works which had called forth the approbation of such distinguished artists as the judges in this competition. He trusted that those who now, it might be for the first time, had thus distinguished themselves, would have frequent opportunities, on future occasions, of showing their fellow-countrymen that they were resolved, as far as in them lay, that England should not be behind the rest of the world in works of industrial art. He begged to offer them his cordial congratulations, and he hoped to see them again in the same honourable position in future years. He trusted they would feel, at all events, that the Society warmly sympathised with them in the struggles they must necessarily make in endeavouring to maintain and improve the position they had acquired. He would now invite the art-workmen present to intimate to the meeting any views they might have formed as to the competition which the Society had instituted. The Council desired to know whether it seemed to them that any alteration in the arrangements would contribute more effectually to the objects in view in these competitions.

Mr. Ashe desired to make the following suggestions:—That in all cases the judges should have the original article placed before them at the time of awarding the prizes, as well as the copies sent in for competition; that the copy should be made in the same material as the original, or if the material is to differ from the original, that such change should be made in the following year or years—for instance, should the material be of iron, then the copy in the first year might be of iron, in the second of brass, &c.; that no specimens sent in shall be either painted, bronzed, or have any artificial coating, except transparent lacquer; that, where it is possible, the model selected be placed in the Society's rooms, or in some other accessible place; with regard to the photographs published for the use of competitors, that the background should be so arranged as not to in any way confuse the outline of the object.

Mr. Holliday suggested that in the case of bas-relief designs the works should be either on a larger or a smaller scale than the original, as this would ensure a proper process of modelling for the work exhibited.

Mr. Nichols remarked that the object would not be gained unless the condition was that the work should be on a *larger* scale than the design. With regard to the chasing in metal, he hoped care would be taken in future that the castings were sound, as this had not always been the case.

The Chairman said he would now call upon a member of the Council (Mr. Hawes), who was present on the last occasion, and was in a condition to compare this exhibition with the preceding ones, to address a few words to the meeting.

Mr. W. Hawes said the great object which the Society had in view in establishing this competition was to bring out the individuality of the English art-workman, and thus give him a greater incentive to improvement. In foreign countries a workman had opportunities of obtaining a personal reputation which enabled him to dispose of his services at a much more valuable rate than when his name and talents were only known within the limits of the shop where he worked, and his productions were only distinguished as those of the firm who employed him. The Society was therefore anxious, without wishing in any way to disturb the community of interest which ought to exist between masters and their workmen, if possible to stimulate the workman to strive after that excellence the attainment of which would be equally beneficial to himself and to his master. The difficulties were considerable in the first instance. They had first to find out the means of making the great body of workmen in the country acquainted with the intentions of the Society. They had then to overcome many prejudices; and besides this it happened that during the last three or four years almost every art-workman was so fully employed that but little time was left him to enter into such a competition. Indeed, on the last occasion the number of works sent in was less than in the previous year, and the number of prizes awarded was less. Considerable discussion took place as to the cause of this decrease, and the impression the Council received at the time was that the conditions required some relaxation. This was done, and

in the present instance they had not only given examples to be copied, but had allowed the men to send works produced from their own or other designs. The result was that they had on the present occasion a number of works made from designs other than those prescribed by the Council, and he thought it was in a great measure to that they owed the increase in the number of works sent in, which was nearly double that on the last occasion; the number of prizes awarded being also considerably greater. He could not but feel that a Society like this, established for the encouragement of arts and manufactures, was undertaking a duty which was specially incumbent upon it in endeavouring thus to benefit not only the working men themselves, but art-workmanship generally, in this country, and if they were doing that, there could be little doubt they were promoting the best interests of the country at large. The works before them certainly proved that the prizes offered had stimulated men to exertion in their spare time, and had resulted in the production of a number of very beautiful works, which had called forth the warm commendation of the two gentlemen who had acted as adjudicators—than whom none were more competent for the task. The Chairman, in addressing the prize holders, had stated his conviction that the workmen of this country would, if proper opportunities were afforded to them, ultimately produce works equal to those of any period of art history, if they had not already done so. He could not help hoping that in a few years this branch of the Society's operations would progress as much as its educational examinations had done, in which, from a beginning of about fifty candidates, they now had nearly 1,200. In like manner they might expect a similar increase in the number of competitors for their Art-workmanship prizes. He would say a word or two with reference to the objection which had been raised against the work sent in by Mr. Page. He had distinctly told them that his work was not struck in a die, and had explained to them how he had contrived to execute it. It had, however, been suggested by a preceding speaker that nothing ought to be admitted for competition but what was done in the old-fashioned way. *Repoussé* work, they knew, was produced in a particular way, and it was argued that no specimen ought to be entitled to a prize unless it was produced in the manner in which all *repoussé* work had hitherto been produced. He thought if they imposed a limitation of that kind they would be acting in direct opposition to everything they proposed to accomplish by these prizes. They not only wished to reward the workman who had the greatest mechanical and technical skill, but also to encourage the adaptation of any improved appliances which his ingenuity might suggest for producing the required results. They must all be struck with the fairness of Mr. Page's explanation, for, though some of the means employed might be new, the work was strictly *repoussé*, and a production of which he had every reason to be proud. It had been more than once suggested that these prizes ought not to be adjudged by one or two gentlemen selected by the Council, but that there should also be a jury composed of workmen and employers of labour. This, he thought, would certainly produce much delay, and would not work satisfactorily. They had had, on this occasion, two of the most highly educated men in this country—one much engaged personally amongst workmen, and well known as possessing special knowledge of such works; the other, Mr. Redgrave, a gentleman whose artistic taste was of world-wide renown, and he thought they had thus the greatest possible security that the prizes were properly awarded, and with the most perfect good faith to the Society and towards the workmen themselves. He trusted the exhibitors on future occasions would appear in still greater number, and that they would all feel that while the Society gave its gold and silver medals for discoveries in science and art, it was equally anxious to reward those whose labour, though in a less exalted field, was equally meritorious, and equally worthy of recognition.

Mr. George Godwin, F.R.S., as a member of the committee for the selection of the examples for reproduction was happy to be able to coincide in the opinions expressed as to the superiority of the collection of articles this year above those of previous years; still it must be remembered that not half the sum offered by the Society had been claimed; and it was to be hoped in future years there would be a more extensive response to the munificent offers made. With regard to the piece of *repoussé* work to which reference had been made, he would state that when the design was selected by the committee they were fully aware of the great difficulty of the task, and if that were a genuine piece of *repoussé* work he accorded the greatest praise to it. At the same time he claimed that it should be found to be true *repoussé*, for he could not go with Mr. Hawes in saying that the mode of production was comparatively unimportant. For instance, by means of the electrotype a *fac-simile* might be produced without that manual skill which was required in the production of *repoussé* work. He quite accepted Mr. Page's assertion that it was a genuine work, but he felt obliged to make this observation in reference to the remarks of Mr. Hawes. Touching the bronzes on the table, there was one figure exhibited of especial interest—that of Caractacus, produced for the Art-Union of London—because it reminded him that 25 years ago, when the Art-Union decided on producing a number of bronzes, and when Mr. Woodington made a reduced copy of Sir R. Westmacott's "Nymph and Child," there was scarcely a furnace in London in which such bronzes could be made, and so great was the difficulty of making the castings that the artist himself erected works to produce them. They went on year after year, and the late Prince Consort was so struck with the efforts that were then being made in this direction, that he paid for the cast of the production, in order that he might possess a copy of this work, the first specimen of the revived art of making bronzes in England. He might point to the bronze before him as being equal to anything that had ever been done; it was a work well entitled to the praise that had been bestowed upon it. The hammered iron work of Mr. Letheren was also exceedingly good. Touching the glass exhibited by Dr. Salviati, all would be glad to see the ancient mode of making glass in Venice revived. At the same time he would enter a protest against regarding every form, because it was copied from old Venetian glass, as beautiful. He confessed he thought the specimen before them was essentially bad in form. No doubt it presented great difficulties in the manufacture; but he thought Dr. Salviati could have exhibited many others of greater beauty. In reviving the art of making Venetian glass, it was important that the models should be well chosen. In conclusion he would express a hope that the art of drawing would form a part of every artisan's education to a greater extent than had been the case hitherto. He would like to see it form a part of the education of every artisan's child, from the conviction he entertained that the greatest advantages would result to them from it in afterlife.

The Chairman, in concluding the proceedings, expressed his belief that they had not been uninteresting or unprofitable to those who had engaged in them. With regard to the remarks of his friend Mr. Godwin, he might say that the specimen of Venetian glass before them was produced in accordance with the model selected by the committee, of which Mr. Godwin was a member, though he was probably not present when that selection was made. His object, however, in rising was to announce what he was sure it would be agreeable to the meeting to hear, viz., that another of the great City companies, namely, the Goldsmiths', had promised its co-operation in the efforts of the Society to encourage art-workmen, and had given a donation of £25, a portion of which was to be applied as prizes for workers in

the precious metals, and the rest in furtherance of the educational examinations. Many of these great guilds owed their distinction, in former times, to the extent to which they contributed to the extension and perfection of various manufactures; and he thought in no other mode could they better contribute towards the same object than by co-operating with the Society of Arts in stimulating and encouraging industrial art. He was happy to find that several of them had already done so. On previous occasions it had been announced that the Salters' and Clothworkers' Companies had agreed to contribute towards this object, and he was glad to find their example had been followed by the distinguished Company to which he had just alluded. He would express his gratification at the proceedings of this meeting, and at having had an opportunity of taking part on an occasion which seemed to him to herald a promise of great future advantage to the industrial arts of this country.

Proceedings of Institutions.

Yorkshire Union of Mechanics' Institutes.—Some years since the committee instituted an Itinerant Village Library for circulation among the inhabitants of the villages and small towns of the country. The plans adopted have been most successful, and many permanent libraries have resulted from the approved value of the itinerant collection. In the course of time the original library has been worn out, and the committee have resolved upon a thorough re-organisation. Sir Thomas Biddulph has informed Mr. Henry H. Sales that it is the intention of her Majesty to renew the gift of 250 volumes made in 1854, by his Royal Highness the Prince Consort. Mr. Titus Salt has generously offered a donation of £20. Other gentlemen have made liberal donations in books and money; and the trustees of Rebecca Hussey's charity have given a grant of books to the amount of £13. It is proposed to raise £250 in aid of the library.

SUPPLY OF FOOD FROM TEXAS.

By Thomas Affleck, Esq., of Washington County, Texas.

Can Texas supply the food-wants of England? She can. Texas is a vast pastoral and wheat-producing country, within a few days' sail. She has innumerable flocks and herds, and valleys capable of being made to yield great and unfailing annual crops of rice. Texas is the most southern of the states of the late confederacy, lying far to the south, yet emphatically a white man's country, from the fact that by far the greater part of her surface is quite elevated, much of it consisting of high, rolling prairie, possessing a rich calcareous soil. Her timbered lands, except in the low alluvial river-bottoms, are elevated, open, and well-drained. As just remarked, the prairie soils are rich in lime; hence the grasses borne by them are sweet and nutritious; and hence again, the meats produced by these grasses are rich and nutritious, in this respect far excelling the meats produced by the coarse grasses of the great pampas, or parched plains of South America, or by the equally arid grazing lands of Australia, where even the coarse sedge-grasses, unnutritious at best, often and utterly fail, compelling the herds to browse upon anything that will support life.

Fat bullocks and sheep can be procured in Texas at all seasons of the year, and can be driven any distance without suffering to the animal or danger to the meat. Bullocks grow to a great size, carry much lean flesh, the fat being about the kidneys, loins, and brisket, not, as in England, intimately mixed with the lean, consequently they are not so good for roasts, steaks, &c., but better for preserving, and for yielding the *Extractum carnis*. The mutton of Texas is remarkably fine, unsurpassed by that of any other country. The supply of meat is great. Prices are at present low, but must advance somewhat with an increased demand. The distance is that of a twenty or twenty-two days' voyage by steam, from Galveston direct, or about forty days by a good sailing vessel.

How, then, can England share in the abundance of Texas? The present ruined condition of the people of the south is well known. Texas suffered less than the others, inasmuch as that she possesses such vast herds of cattle, sheep, horses, and mules, is less inconvenienced by the destruction of her labour system, and was never invaded by the enemy; still her commercial resources are altogether insufficient to carry her immense and valuable productions to market. She has beef and mutton, game and poultry, oysters, fish and turtle, wool, hair and hides, in prodigious quantity, as also much cotton. She possesses well-nigh inexhaustible forests of lime, oak (*Quercus virens*), of cypress (*Taxodium distichum*), long-leaved or great southern pine (*Pinus palustris vel Australis*), together with many other valuable timbers. Of iron, copper, lead, gold, silver, and other minerals, and of coal, the store is great beyond computation. Nearly all of the rivers west of the Bragos afford water-power enough to work up all the raw materials produced. Her limits embrace some one hundred and seventy-five millions of acres! Much of this, perhaps, more than of any other equal surface of the globe, is of rich and productive land, well watered, and suited to the growth of all of those crops most valuable to man, by the labour of the white race, as cotton, sugar, rice, indigo, tobacco, hemp, madder, the oil-producing seeds, hops, wool, &c.

Rice can here be safely cultivated by the white man, because the lovely valleys of Western Texas, so easily susceptible of irrigation, will, with irrigation, produce it in abundance, and without any marked deleterious effect upon the health of the cultivator. Sugar is not only produced from the cane, but the beet thrives exceedingly in the prairie soils of Texas. She needs *population* as part of the return cargoes of the ships taking her products. Hence the desire for direct communication with Europe, now denied us by the hitherto indifference to, or overlooking of, her commerce on the part of European merchants. Let England import of our excess—of that first necessity, food, and especially meats—and send us of her surplus population.

In what shape and how shall these meats be exported? The climate, although a warm one during the greater part of the year—ranging from 60° to 90° from March until December, exclusive—is clear and dry, fine cooling breezes prevailing, and the nights always cool, so that meats can be handled almost the year round. Dr. Morgan's infiltration process can be successfully employed for salting, and will be; but the consumption of salted meats is limited, and the market easily glutted. When, however, the Morgan process comes to be used upon the healthy, sound, nutritious beef of Texas, and other antiseptics used with the salt, and when the causes which produce scurvy are more generally understood, salt beef will be more extensively used.

Meats have long been successfully cured by being cooked and hermetically soldered up in tin cans, as are also various rich soups, oysters, fish, &c. Although these articles, and others thus preserved, are extensively used on shipboard and abroad, the high prices at which they are retailed has prevented their coming into every-day use. But, suppose they could be offered at a less price than that of butchers' meat—already cooked, always at hand, and especially the rich soups thus preserved, and in many varieties—would they not be brought into common use? The wife of the labouring man is only too often but an indifferent cook—here is the article almost ready for her family, and in a palatable form. The wives of those classes who are better off would find a few dozen cans of preserved meats, soups, fish, oysters, &c., extremely convenient, from which to supply that variety to their families which is always desirable, and to meet those frequent emergencies with which the housewife has to contend.

The process of Messrs. Sloper and McCall has been pronounced an entire success. It is as yet held to be a secret, and may, or may not, prove an ultimate commercial success. There are other similar processes which are well understood, but it is greatly to be doubted if any of them will prove the successful medium through which England's wants, in the way of fresh meats, will be supplied from distant countries.

Professor Redwood's patented method of cooking boneless pieces of meat in that pure, tasteless, and colourless substance, paraffine, is not only a good plan, but one based upon correct principles. Whilst the mere water is evaporated from the meat, the whole of its juices are retained, and the coating of paraffine excludes the air. It needs a thorough trial upon a large scale, and commercially.

The writer, with some friends, partook of a broiled beefsteak, the other day, taken from a can in which it had been placed, uncooked, in October, 1865, having been first soaked a short time in a solution known as the "British Meat Preserver," offered by a company under that title in Upper Thames-street. The steak was excellent, a little dryish, though still juicy. The only objection that could be found to it was a slight after-taste upon the tongue, which, however, an onion-dressing would have disguised.

There seems one plan by which meats imported to England, by any or all the processes of preserving in tin, those of Messrs. Sloper and McCall, Professor Redwood, or the Meat Preserver Company, may readily be brought into common use, and prove the boon to the people which wholesome, well-cooked food must ever prove; and this is by the establishment of numerous cheap eating-houses in the cities and towns of this populous island, at the various collieries, potteries, cotton and other factories, foundries, rolling mills, &c., wherever large bodies of hard-working men are employed. This has been done in Glasgow by a philanthropic gentleman there, Mr. Corbet, and with the most perfect success. There a tired and hungry man satisfies that hunger fully and comfortably upon wholesome, well-cooked food, for fourpence.

Reform seems to be the exciting topic here at present. Here is the first and safest measure of reform—feed the people. Joint-stock companies seem to have fallen into great disrepute here; nor is it greatly to be wondered at that they should, as they have been originated and conducted. But here is an object—a purpose—for which such companies might be safely formed; requiring no great amount of capital, yielding immediate and sure returns, and open, in their management, to every one who chooses to study their workings. Such companies could not only feed the labourer at home, but, by the employment of shipping in importing meats from abroad, afford transportation to other countries to a portion of the plethora of population here.

The masters and owners of large factories, rolling mills, &c., would have fewer strikes to complain of, if they showed a greater interest in the physical comfort of their employés, by aiding and encouraging the establishment of cheap eating-houses, co-operative stores, &c. The economy to the labouring man, and the effect upon the comfort and health of his family, would have a wonderful influence upon him in every way.

There is yet another plan by which meat, in the form of fresh joints, &c., fresh from the shambles, may be brought from Texas to England. As applied to ripe fruits, it has proven a complete success in America. It is, to form the hold of a sailing-ship into a series of comparatively air-tight and moisture-proof rooms, in which the temperature is kept at a low point by a layer of ice overhead; some cheap and powerful absorbent of moisture being spread on the floor, to take up that which the meats suspended in the room may throw off. Similar means may be employed to act upon the air in the rooms. Within these rooms, the best joints of meat, suspended in close contact, firmly attached to fixtures, and with rush mats, perhaps, between the courses, to prevent chafing, could be carried from Texas to England in as fresh a state, it is believed, as if newly killed; only, perhaps, a little less juicy; and hence they would be less liable to damage from re-exposure to the air than if not thus dried. By opening room after room, as required for sale, there would be neither loss nor waste.

And here permit a digression. It is understood that a very perfect building for meat markets is now being erected in London. Would it not be wise to arrange overhead such refrigerators as those suggested, in which the surplus meat of each day might be preserved fresh and sweet until sold? As matters are now conducted in the meat markets, much of that costly food is carried off each day somewhere for consumption or use, in a very unfit condition to serve as wholesome food.

In all such arrangements it must be borne in mind—and experience in America has proved the fact—that air which has passed over or in contact with ice, although it thereby loses its moisture, imbibes gases which are exceedingly injurious to animal food with which it then comes in contact.

But, to return—Dr. Hassall's flour of meat is another form in which importations may be usefully and profitably made. Even at the present high prices of the fresh article, the flour of meat is prepared and sold, no doubt, with profit.

Good fat meats cost in Texas, beef, say 1½d., and mutton 2d. per lb. Reckoning all the expenses of killing, curing, transportation, risk, and occasional loss, cost of selling, &c., these meats could be supplied to the consumer at prices greatly below what he now pays.

There is already a large consumption of the *Extractum carnis Liebig*. If it could be sold at a price to allow of its economical use in the kitchen, there is scarcely a limit to the demand which would arise; and this could be done if it were made from the rich and nutritious flesh of the beeves fed on the *mesquit* grasses of Central and Western Texas.

There are difficulties in the way of any extensive importation of flesh-food from Texas. To be done profitably it must be on a somewhat extensive scale, even to begin with. Few individuals likely to go into a business of this kind have the means at command to engage in it on a sufficient scale. There are breeders of cattle in Texas who would gladly engage in it if their cattle could be made to serve as the basis. Money is with them a scarce commodity.

The owners of the money and the meat must combine. Joint-stock companies are, at this time, as I have before observed, rather unpopular in England; yet it might surely be possible to form a combination of a few business men here, with cattle-owners and others in Texas, to do this thing of so much importance to the people of this island, and to do it prudently and profitably.

RUSSIA AT THE PARIS EXHIBITION OF 1867.

The Russian section occupies about 1,000 metres, in the rectangle part of the park, situated between the Palace and the Avenue de Suffren. There will be seen there:—

1st. A large shed, 30 metres long by five wide, in the Russian style; on the ground-floor will be exhibited agricultural machines; on the first-floor will be found an inquiry office, lodgings for six moujiks, and a store-house for forage.

2nd. Opposite the office of the Russian Commissioners, a pavilion in wood, very much ornamented, in the style of the boyars of Northern Russia. The entire mechanism of construction is visible. The purlins of the roof rest upon the principal rafters of the gable, and are held above by pegs of wood. The stove, with its cooking place, is, as usual, of terra-cotta.

3rd. A large isbah, or peasants' dwelling, composed of three buildings, grouped together; it is built of red pine, forming a complete dwelling; the walls are com-

posed of round barked trees, trimmed with the hatchet. The underpart of each piece of wood is grooved, so as to receive the upper part of the lower piece. The joint is packed with oakum. The ground-floor is appropriated for stabling. The first-floor, divided into two chambers, comprises the dwelling for the peasant and his children. In one corner is placed an immense stove of terra-cotta, which serves both as an oven for bread and for heating purposes. The staircase is outside. Joined to this building is a covered court, serving specially as a place of shelter for the farm carriages. There is also a small habitation (without stables) of white pine, arranged as in the large dwelling: it is a sort of lodge, with portico in front. Neither nail nor peg is used in these different constructions. The isbah altogether represents the arrangements on a large estate in Russia. They are put up by M. Gromoff, one of the largest timber merchants in St. Petersburg.

4th. A vast building, of 76 metres by seven, intended for stables, in which will be seen twenty-four horses, of which ten are the types of different races of Russian horses, and fourteen are to be carriage or riding horses. The first-named horses are placed sideways, in longitudinal boxes. They can thus be readily untied from the wall, and can easily be thoroughly examined. At the two extremities will be lodgings for ten moujiks. This building is highly ornamented. The style is an application of the art of the Central Russian hospodars, as used at the present day. Carved wood is much used in the decoration.

5th. A yourta, or tent, of six metres in diameter. It is made of felt, in the form of a hive. Above, an open space leaves passage for the light and the external air, and for the smoke from below. It is the national dwelling of the Cossacks and wandering Tartars.

In the space devoted to Russia will also be found a sign-post and a milestone, indicating the distance from St. Petersburg to Paris.

RATISBON CATHEDAL.

It appears by the description referred to in M. Schubarth's letter (p. 157) that, the first cathedral of Ratisbon having been destroyed by fire in 1273, the foundations of the present structure were laid in 1275, and the building was continued, with frequent interruptions, up to the year 1496. Some portions, however, still remained unfinished; the present altar was not erected till 1785, and from 1834 to 1839 King Ludovic I. of Bavaria effected much towards the improvement and restoration of the building.

In 1858 an association was formed at Ratisbon, under the patronage of the King and the Bishop, for restoring and completing the cathedral, especially the two principal towers, surmounted by spires, which are to be raised from 152 to 365 feet in height. The work was begun in 1859, but up to 1863 the funds at the disposal of the association were but small. In that year the King undertook to promote the undertaking by an annual grant of about £1,700 sterling, and from that time the works have proceeded much more rapidly, though the funds appear to be still insufficient. Since 1860 about £2,600 has been spent on the building, which, it is anticipated, will be completed in 1870. The progress of the works is illustrated by the photographs kindly forwarded by M. Schubarth.

Fine Arts.

Nelson Column.—The lions some years ago entrusted to Sir Edwin Landseer have at length been completed, and are now in their place at the base of the column. The cost will be indicated by the following entry in the estimates for the Civil Services. Nelson Column, Trafalgar-square:—An estimate of the sum that will be required to defray the charges which will come in the course of payment in the year ending 31st March, 1867, towards completing the stylobate, &c., of the Nelson Column: For four colossal couchant lions, to be executed and placed on the radial pedestals prepared to receive the same: total estimate for the service, £17,183 10s. 1d. Vote required for the year 1866-7, £6,000.

Photographs of Pictures in the National Gallery.—The arrangements for this work, noticed last week, are approaching completeness. It will consist of three volumes, folio, after the style and size of the Turner Gallery. The issue will, in the first place, be in monthly parts, at a guinea each. The entire work will contain 360 photographs, representing 180 masters. The text is committed to the care of Mr. R. N. Wornum, the keeper of the gallery. The same author's Descriptive Catalogue, "Epochs of Painting," and "Life of Holbein," indicate the materials at command. It is understood that Mr. Wornum will adopt a historical classification, a treatment which will combine the characteristics and chronology of schools, with the incidents of individual biography. Messrs. Virtue are the publishers. The photographs have been taken, as already announced, by Messrs. Caldesi.

Kensington Museum.—An ingenious contrivance has been adopted for the exhibition of numerous drawings within a small area. The apparatus has the appearance of a wheel with radiating and moveable spokes hung round an axle. These spokes or wheels, which are in fact picture frames, contain the drawings or other works designed for display. The plan may with advantage be adopted in provincial museums and schools of art, especially where wall space is scanty. It is at once to be brought into requisition in the Paris Exhibition. One of these pictorial machines will demonstrate to the French some thirty stages of study in British schools of art; another will display various reproductions, such as photographs, electrotypes, and fictile ivories, made and disseminated by the Department of Science and Art.

National Gallery.—Among recent additions is a picture, "Christ and the Disciples going to Emmaus," by the rare Milanese master, Altobello Mellone. This painter, though almost forgotten, is praised by Vasari, and the picture now added to our National Gallery is expressly mentioned by Baldinucci. Altobello Mellone, who flourished at the beginning of the sixteenth century, was of the schools of Cremona and Milan. In the cathedral of Cremona he executed frescoes from the life of Christ, which Vasari says were "exceedingly beautiful, and truly worthy of commendation." This picture of the journey to Emmaus was formerly an altar-piece in the church of S. Bartolommeo de' Carmelitani at Cremona. It was purchased from the Conte Carlo Castelbarco, Milan, by the late director, Sir Charles Eastlake, as far back as November, 1864. It remained some time in Milan for the purpose of reparation. It is said, however, to have been in fairly good condition. It is painted in oil, on panel; it measures 4 feet 10 inches by 5 feet 5 inches; it is not signed; the figures are life-size; the price was £320. The work is of special value in our National Gallery as a link in a historic series. It is a fair example of Lombard painting; it serves to show that at the time art in Tuscany and Rome was at its height, the chief cities of Northern Italy also became centres of separate schools, and were prolific in pictures by masters once famed though now forgotten.

Manufactures.

Birmingham Manufactures.—Exhibitions of industry are now recognised as institutions of all countries; as such they are supported, and it may be questioned whether any locality has been benefited thereby to the same extent as Birmingham. The display of the works produced there, publicly exhibited on the stalls of exhibitions, showed to the world that these were not "lacquered shams;" and the result of each succeeding exhibition has been to demonstrate that

Birmingham industry is progressive, capable of improvement, and improving; that while producing the useful, she is equally successful in the production of the ornamental. The means by which her position has been vindicated, her progress rendered strikingly apparent, and the demand for the productions of her manufactures in brass increased, is owing to the publicity and to the instructive lessons afforded by Industrial Exhibitions.

Commerce.

Fishery Exhibition at the Hague.—An Exhibition of Fishing Implements and Produce is to be held at the Hague, in the present year, by the Society for the Encouragement of Industry there. The importance of the Exhibition held in Amsterdam in 1861, and the beneficial results obtained by it, being now fully acknowledged, and Norway and France having followed the example thus set to them, the Society for the Encouragement of Industry, desirous of promoting the interests of this branch of commerce, and having observed with great interest the steps taken for the improvement of fishery during several years past, proposed to hold an exhibition of Fishing Implements and Produce at the Hague during the time of the ninetieth general meeting of the society, which will take place this year. The Hague, situated close to Scheveningen, an important fishing port and bathing-place on the North Sea-coast, has lately been greatly extended and embellished, and is moreover well known for its beautiful environs. Yet the most important reason for choosing it as the seat of an Exhibition of fishing implements and produce is, that the Hague is the principal town of the province of South Holland, which province is intersected by streams and currents, and contains the fishing-towns and ports of Scheveningen, Katwijk, Noordwijk, Pernis, Dordrecht, Middelharnis, Zwartewaal, Maassluis, and the ancient town of Vlaardingen, whose history has always been connected with fishery. Besides these advantages, the Exhibition will be supported by the authorities, grants having been made by the Provincial States and the Municipality of the Hague, so that all things tend to insure the success of the undertaking. The Exhibition will include every object connected with sea and fresh-water fishery. The articles will be divided into twelve classes, in the following order:—1. All sorts of fishing-smacks, boats, &c., used for fishing purposes, and drawings thereof. 2. Every object used for rigging and fitting out these smacks and boats. 3. Fisherman's clothes. 4. Implements used for fishing, viz., nets, ropes, hooks, harpoons, &c., and the raw materials for making these nets and ropes. 5. Various sorts of tan, serviceable to preserve and maintain the nets. 6. Bait for fishing (natural and artificial). 7. Implements used for the preparation, to salt, smoke, and dry fish, as well as salt used for the purpose. 8. Fish unprepared, prepared, and packed. 9. Packing materials, and all other objects used for the exportation of fish. 10. Objects of general use in connection with fish and other sea-animals, such as train-oil, whalebone, and manure. 11. Models of basins, folds, hurdles, vases, boxes, &c., and the preparations used for the artificial culture of fish and crustaceous animals. 12. Books about fishery. At the close of the Exhibition, gold, silver, and bronze medals, as also honourable mention, will be awarded to such exhibitors as shall have distinguished themselves. Freight to and from the Exhibition, as also insurance of the articles exhibited, against fire and sea damage, will be paid by the Committee, on condition that the regulations made by them, and which can be had on application to the Secretary of the Committee, are strictly followed by the exhibitors. The exhibitors are requested to take the greatest care in packing, as, should damage or injury to the objects be caused by bad packing, the Committee will not be responsible. The objects to be exhibited must be in the hands of the Committee before the 15th of May. The exhibitors have the right to sell the articles exhibited, which, nevertheless, cannot be withdrawn before the close of the Exhibition. Any person wishing to exhibit, must give notice to the Secretary of the Exhibition, J. A. van Iterson, Esq., at the Ministry of Justice, the Hague, before the 15th March.

Sugar Manufacture in Russia.—Herr F. O. Licht, of Magdeburg, quoting from the *Neue Presse*, gives the following statistical statements about the beetroot sugar production in Russia for the season 1864–5 :—"At the beginning of the season 1864–5 there were 336 sugar factories in Russia, 63 of which remained inactive during that season, leaving only 273 out of the 336 manufactories at work. The quantity of sugar produced amounted to 3,326,141 poods, or 53,455 tons (English measure) of raw sugar, that is to say, 6,864 tons more than in the previous season. The duty levied on the raw produce amounted to 615,303 roubles 70 copecks (nearly £93,000 English money), while the amount for the certificates of the manufactories amounted to £5,200. The number of labourers was 40,304 men, 16,723 women, and 4,645 children. According to the following statement, the production in Russia, for several years past, was :—

Years.	Manufactories.	Tons of Roots.	Tons of Raw Sugar.
1859-60 ..	424	833,988	26,519
1860-61 ..	398	708,233	21,246
1861-62 ..	353	573,418	17,202
1862-63 ..	299	542,073	11,990
1863-64	no returns ..	.. ..	46,591
1864-65 ..	273	1,011,762	53,455

Sugar in France.—From the circular of M. Boulanger, and from the official returns of the *Moniteur*, we (*Produce Markets' Review*) extract the following statement as to the movements of sugar in France during the seasons 1865-6 :—

	1866.	1865.
Factories at work.....	439	419
	Tons.	Tons.
Production so far of the season..	155,383	182,546
Average monthly production ..	53,398	57,090
Average monthly consumption ..	15,401	22,663
Average monthly export	2,773	11,461
Stock in the factories	65,278	52,419
Stock in the Lille entrepôts	3,734	4,286
Stock in other entrepôts.....	36,920	29,509
Total stock	105,932	86,214

From the above it will be seen that, notwithstanding a decrease in the production of 27,000 tons, the stocks show an increase of 19,000 tons. This circumstance is explained by a reference to the exports, which give only 6,000 tons in 1866, against 33,000 tons in the same period of 1865. The sugar production during the last two seasons was thus distributed :—

	1864-5.	1865-6.
First four months ..	121,913 tons.	182,546 tons.
Last eight months ..	27,101 „	91,467 „
Total	149,014 „	274,013 „

Assuming the last eight months of the present season to be in the same proportion to the four previous months as in the season 1864-5, the remainder of the production would amount to 35,000 tons, and bring up the total to 190,000 tons. If we take the proportion which existed between the first four and last eight months of the season 1865-6, the remaining production would be as much as 78,000 tons, and the total production would be 233,000 tons. In all probability the production will be between these two extremes, and will reach about 210,000 tons. The manufacture was carried on in December with almost as great activity as in November; in fact, there were four factories which only commenced work in December.

Colonies.

PRICES OF FOOD IN VICTORIA.—The promise of abundance fills the farmers of this colony with fear lest prices should fall below the remunerative point. It is alleged that in Adelaide wheat of the new crop is being purchased at 3s. 6d. per bushel, delivered in January, and the farmers are alarmed at the prospect of the same prices ruling in Victoria. A conference has been held at Melbourne of delegates from several agricultural districts, to devise means to have a corn tax imposed, when, after much discussion of the comparative merits of a fixed and a sliding scale duty, they decided in favour of the latter, and resolved to take active measures to induce the Legislature to impose such a duty. It is generally understood that the farmers will not be content with any arrangement that permits the price of wheat to slide much below 7s. a bushel, or something like double what its true value is likely to be in future. Some want the Legislature to fix the price at 7s., some at 6s., and some are so moderate as to say they would be content with 5s.; but there is no likelihood that the colonial parliament will do anything whatever in the matter.

Obituary.

JEAN AUGUSTE DOMINIQUE INGRES.—The patriarch of French painters died at his house on the Quai Voltaire, Paris, on the 15th January, in the 87th year of his age. He was born at Montauban, on the 30th of August, 1780. His father was a sculptor in plaster, and young Ingres came to Paris in his seventeenth year, and in 1800 he won the second prize in painting, and two years later he won the grand prize, which made him nominally a pensioner of the French school in Rome, but the finances of the country were then in so low a condition that there were no funds for such purposes, and he remained in Paris, earning a scanty livelihood by his pencil. In 1806 he obtained the means of going to Italy, and from that time he was more Italian than French; in fact it is said that, with the exception of ten years, he lived constantly in Italy until he was about sixty years of age. His absence did not, however, prevent his contributing to the exhibitions of Paris; and the list of his works, though not long, is considerable. Amongst them the best known or most remarkable are, "Achilles Receiving the Messengers of Agamemnon," which won him the great prize, now in the school of the Beaux Arts, in Paris; Portraits of Napoleon as First Consul and Emperor; "Raphael and the Fornarina;" and many others, especially "the Apotheosis of Napoleon I.," a ceiling in the Hôtel de Ville of Paris; "La Source," shown at the International Exhibition in London in 1862; and many fine portraits. In 1834 the dispute ran so high between the admirers of Ingres and of his rivals, and especially those of Ary Scheffer and Delacroix, that he ceased from that time to send his works to the Paris Salon. At the Paris Exhibition of 1855, two special rooms were set apart for the works of Ingres and his great rival Delacroix, and each received a grand medal of honour. Ingres had received nearly all the honours which are bestowed upon artists; he was decorated in 1824, and in 1854 was made Grand Officier of the Legion of Honour, and in 1862 he was made a Senator. He had been a member of the Institute of France for thirty years. Ingres devoted himself wholly to the study and imitation of the Italian school. His drawing of the human figure was faultless, and his designs will take rank with those of the great Italians whose works inspired all his efforts. Originally, Ingres's father destined him for a musician, and he became an excellent violin player. His funeral was attended by a vast concourse, the Emperor being represented by Comte de Nieuwerkerke, chamberlain. After the funeral the Emperor sent an autograph letter of condolence to Madame Ingres. Some of the most famous paintings of Ingres will be shown at the forthcoming Universal Exhibition, and their interest will be greatly enhanced by the death of the artist.

Publications Issued.

THE GEOGRAPHICAL DISTRIBUTION OF MAMMALS. By Andrew Murray, F.L.S. (*Day and Co., limited.*)—This work is of a high educational character. It consists of three parts, each of which in itself contains materials for a separate work. The first part, or introduction, treats of the principles through the action of which the present distribution of plants and animals has been produced; and, of course, among a multitude of other speculations, the origin of species occupies a prominent place. Mr. Murray's views upon it are decidedly the most important part of the book; and, if Darwinism be true, will help to remove a great stumbling-block from the way of its acceptance. The reader knows that a chief, probably the chief, practical objection to Mr. Darwin's theory of the change of species by a gradual long-continued principle of variation being constantly in operation in all animals, is that no evidence of transitional forms has ever been found in past geological epochs, nor observed at the present time, but the contrary; whereas if the theory were true, a gradual transition should be observed by geologists in the fossil remains, from the oldest formation down to the newest, and in living species there should be universal confusion—nothing but a multitude of individuals in different stages of change and progression to something else. In fact, as put by Darwin, species would be impossible. As Mr. Murray says, "he has no brake by which to arrest the progress of variation when a species was completed." According to Mr. Murray's hypothesis, change in the animal only takes place when it is subjected to change of condition, the subtle effects of which, on a small scale, we all acknowledge by our periodical migrations to the sea side or country quarters for change of air. It is scarcely fair to state the hypothesis without also mentioning the concurrent views by which the author reconciles the difficulties, and anticipates the objections to his theory. These, however, would occupy too much space. It will be sufficient to say that the above is the key offered for the solution of the problem. According to it the normal state of organic beings is stability, not variation, as supposed by Darwin. So long as conditions are unaltered, or so slowly altered as to make the change imperceptible, species will remain the same; time, therefore, does not enter into the question except as multiplying the opportunities of change. But, whenever a change in condition does take place, a modification of species follows. Mr. Murray draws strong support from the facts of geology, showing how, when the temperature of the earth was greater, and, consequently, less variation in condition existed, the changes in form were few, and that, as the temperature decreased and conditions multiplied, so did species; and how, when the most important change of all—the glacial epoch, when for the first time the earth knew frost and snow—appeared, most changes of all took place, and, to all appearance, man among them. The second part of the work is devoted to the actual distribution of mammals—upwards of a hundred chromolith maps being given, showing the extent of the distribution of different families and genera; the past changes of sea and land; the former union or separation of continents as deduced from them and from the affinities of the mammals now found on them; and the past distribution, as gathered from the fossil remains of extinct allied forms—all are treated of at length. Palæontology forms a large portion of the subject of the volume; and although there are some parts, relating to the affinities and classification of species, which are rather dry reading to one who is not a naturalist or an anatomist, the whole is replete

with interesting speculations and attempts to solve puzzling questions relating to the past condition of our globe. From the data he has brought together, the author divides the world into four great regions, each sub-divided into one or two lesser provinces. The third part, or appendices, obviously contain the results of a great amount of study, but of course their value is that of a work of reference. The publication of a separate reprint of the first part and other general matter would be desirable, leaving the more technical information and details to be obtained by the naturalist and man of science from the more expensive quarto now published.

The Textile Manufactures and the Costumes of the People of India.* By J. Forbes Watson, M.A., M.D., Reporter on the Products of India to the Secretary of State for India in Council. (*Printed for the India Office.*)—This work, a copy of which has been presented to the library of the Society of Arts by the Secretary of State for India in Council, constitutes the key to twenty collections of Indian textile fabrics, each comprising seven hundred working specimens, which have been distributed in this country and in India for the purpose of illustrating this branch of commerce, and facilitating and promoting trade operations between the two countries. Of these extensive collections, each of which is contained in eighteen large folio volumes, seven have been sent to India, while a single copy has been deposited at each of the following places in Great Britain:—Belfast, Bradford, Dublin, Edinburgh, Glasgow, Halifax, Huddersfield, Liverpool, London (India Office), Macclesfield, Manchester, Preston, and Salford. It is intended, as stated by the author, that each of these sets should be rendered "easy of access to agents, merchants, and manufacturers," and indeed to anyone bearing an order from (amongst others) the Secretary of the Society of Arts. The smaller work affords a detailed explanation of the objects that the author had in view in forming the collections referred to. "The interests of India require," he says, "that nothing should be done to prevent her from receiving the benefits which may arise from competition between different sources of supply, or to interfere with the extension to other countries of the knowledge of the manufactures and products she is prepared to sell. It is admitted to be for the mutual advantage of India and of this kingdom that the most intimate commercial relations should exist between them. Nothing will conduce to this more certainly than a full and correct knowledge of what India can produce and what her people want. The means of acquiring this knowledge these volumes furnish, so far at least as textile manufactures are concerned. The twenty sets may be regarded as twenty industrial or trade museums, placed here and there in the two countries, and it is but a reasonable expectation that they will be extensively studied and consulted by the manufacturers of both. The result of this will assuredly be an increased interchange of commodities. The British manufacturer will learn what goods are likely to prove saleable in India, and what he can produce more cheaply than the native can; while the British merchant may find among some of the delicate fabrics of India, or of those which are elaborately decorated, articles which it will be profitable to import, because they can be made more cheaply in the East. In addition to this, in consequence of each set being as much as possible an exact counterpart of all the others, these museums will facilitate trade operations in the way already described, and will enable merchants to give, and manufacturers to execute, orders more readily and more accurately than they otherwise could." This work, and the collections it explains, will certainly teach many valuable lessons to manufacturers in this country, so as to enable them to adapt their productions to Eastern tastes and wants. It is important that they should know that a large proportion of the clothing of the people of India consists of articles which are untouched by needle or scissors, and which, in fact, leave the loom in a state ready to be worn, such as shawls and scarfs. The importance of only using fast colours is strongly urged, as the clothing of the Hindoo is frequently washed, and a failure of the colour naturally destroys the value of the fabric. Other points are, that the clothing of the people of India "is chiefly made of cotton; that there are certain colours, or tones of colour, which are favourites; that gold is largely used in the ornamentation of all sorts of fabrics; and that in the decoration of every garment regard is always had to the special purpose which that garment is intended to fulfil." It appears hardly to be expected that the British manufacturer will ever be able to supply the higher classes of the natives, as he is scarcely likely to be in a position to compete with the native manufacturer in the more beautiful and expensive classes of fabrics, but he may hope for a large and lucrative trade with the lower classes. This work, and the collections it describes, seem likely to be of the greatest value in promoting our trade with India; and any member of the Society of Arts desiring to inspect any of the collections (one of which, it will be observed, is deposited at the India office) can do so, as above-mentioned, on applying for an order to the Secretary of the Society.

* An edition of this work, with coloured plates, has been published by the Messrs. Allen, Waterloo-place, price £3 5s.

Notes.

New Courts of Justice.—The exhibition of the competitive designs, in New-square, Lincoln's-inn, opens this day (Friday). That and the following day are reserved for private view. The drawings will be open to inspection for a month. The exhibition of designs for the new National Gallery closed on Saturday last.

The Colonies at the Paris Exhibition.—The colony of Tasmania, to which 650 feet of space was allotted at Paris, by the last advices declines to exhibit, although it made a very admirable display at the International Exhibition just held at Melbourne. The Cape mail lately arrived announces that the House of Assembly there had voted £1,000 to defray the expense of that colony at the Paris Exhibition. Thirty feet has been allotted by the British Executive for a display illustrating the arts, manufactures, and commerce of west and central Africa.

Fruit and Vegetables in India.—Lofty and spacious market-sheds, for the sale of meat, vegetables, and the various other articles *de consommation* to be found in an Indian bazaar, have recently been introduced into Bombay. These erections were to be opened about the middle of January, by the holding therein of a horticultural exhibition. Upwards of £300 has already been subscribed for prizes, and the committee have thus been able to offer both valuable and numerous prizes to the successful competitors. The whole list of fruit, flowers, and vegetables, in regard to which competition is invited, comprises a total of some sixty varieties. In the glowing climate of India, florists must always have the advantage over horticulturists. While the finest flowers which at home are precious hot-house treasures, will almost look after themselves in India—always supposing there is plenty of water at hand—the products of the kitchen garden require much painstaking, in order to produce them remuneratively, of proper flavour and in constant succession. With regard to exotic fruits and vegetables, especially those which are of vital importance to the European residents, the backwardness and neglect of anything like market gardening on the scale that is required for Bombay appear to be very considerable. The committee of this market-show have, there-

fore, done wisely in apportioning 27 prizes for vegetables, while 17 suffice for fruit and 15 for flowers. Special prizes have been offered for vegetables grown in soldiers' gardens.

Life-Buoys.—A new life-buoy has been invented by M. P. G. Pignonblanc, the efficiency of which has been tested by very competent persons. It appears to be as ingenious as it is simple, and has the great merit of always being handy and applicable in nearly all cases of shipwreck. The life-buoys at present in use only sustain the person on the surface of the water, but do not guarantee him either from cold, hunger, thirst, or from sharks, that are met with in great numbers in hot climates; and once abandoned on the sea the man is unable to have any repose. On board even the largest ships there are but few life-buoys, and in case of shipwreck but few persons can take advantage of them, and in a heavy sea those unfortunate persons are soon knocked about and drowned by the waves. The life-buoy of M. Pignonblanc is simply an ordinary cask, the bunghole of which is enlarged in order to admit a man, and round this hole a sleeve of canvas is nailed about 18 or 20 inches in length, and may be secured with a short piece of spun yarn. This sleeve is only closed when the breakers are very heavy, in order to prevent the water from entering into the cask. In order to prevent the cask from rolling, a weight or piece of iron is attached by means of two pieces of cord. The inventor states that he got into the cask at about 200 yards distance from the shore, on which the waves broke violently. The cask drifted slowly towards the breakers, the first of which caught the cask, which inclined slightly but was instantly lifted up again. The second and third drifted it towards the land, where the fourth breaker safely deposited it. The piece of iron then served as an anchor, and instead of being washed back to sea the cask remained on dry land. In this cask provisions may be taken and be kept dry, and the person may rest himself as in a hammock.

Russian Railways.—During the month of October, 1866, the railway from St. Petersburg to Moscow conveyed 136,235 passengers, 55,667lbs. of luggage, 4,323,563lbs. of goods; and its receipts were 1,200,406 roubles, which is 136,281 roubles more than in the corresponding month last year. From the 1st of January to the 1st of November, 1866, this railway conveyed 1,170,723 passengers, 538,285lbs. of luggage, and 41,178,815lbs. of goods. Its receipts were, during that time, 10,339,774 roubles, which makes an increase of 1,375,088 roubles over the corresponding period of 1865.

Encouragement to Science.—M. Frémy, member of the Academy of Sciences of France, has put forth a proposition, which is not unlikely to be adopted by the Government. He says that the career of science is that which offers the least security. A young man devoting himself to scientific pursuits has difficulties of all kinds to contend against; and many real *savants* reach their fiftieth year before they can obtain even the modest employment of *préparateur*, while many of the greatest discoverers leave their families in absolute poverty; there is, therefore, a natural hesitation to enter on a purely scientific career, and science loses the services of many intellects of the first order. Another evil is that young scientific men, unable or unwilling to wait, enter into manufacture without that complete knowledge which would render them so much more valuable in the scientific trades. Professorships are necessarily limited in number, and occupy a considerable portion of time, which might be devoted to original investigation; besides, says M. Frémy—and although a truism it is often overlooked—it is not every learned man who has the qualities necessary for a good teacher of his art. M. Frémy's proposition is that there should be established sixty places, or titular professorships, in three classes, with salaries of two, four, and six thousand francs per annum respectively, and that these appointments should only be given to those who have done real service in the cause of science; and he proposes the adoption of the plan of the Ecole Polytechnique, in which establishment the professors, assistants, and examiners have to submit to re-election every third year, in order that the places shall not become equivalent to retiring pensions. The total cost of such an arrangement as that proposed by M. Frémy would be £9,600 a-year. It is beyond question that of all classes of educated men those who follow pure science have the most difficult and most thorny path to tread; and now that industry is calling for all the science it can obtain to improve its productions, the value of original research becomes daily, not more important, but more evidently so. The principle advocated by M. Frémy has already been applied in the case of the Museum of Natural History of the Jardin des Plantes, where a laboratory was established last year by the Minister of Public Instruction, on the proposition of M. Chevreul and M. Frémy, where more than fifty young scientific men are enabled to pursue their studies, and carry on original investigations under unusually favourable circumstances, and without cost to themselves. The scheme of the great public laboratories of Prussia has naturally drawn the attention of the *savants* of France to the policy, and even the necessity, of taking all possible precautions to prevent their own country being outstripped. The proposal applies to France alone, but the principle to all countries. M. Frémy would have the Government supply the funds, and give to the Academy of which he is a member the power of nomination; but such a plan would not have general support in France, and in other countries it would be still less acceptable. But the value of the pursuit of original scientific investigation, in a commercial sense, is now so generally understood that, if ten thousand a-year would materially aid its professors, there ought to be little difficulty about the matter.

Correspondence.

Iron Permanent Way.—Sir,—As I was not able to assist at the discussion of Mr. Rochussen's paper on "Iron Permanent Way," will you allow me space in your journal to contribute some of my own experiences? Mr. Rochussen appears to have stated that the difference between my wrought iron permanent way and that he advocated was, that I suspended my deep rail from two angle irons with the horizontal webs above, whereas on his plan the horizontal webs were placed below. This is not a distinction without a difference, but it is at variance with fact, inasmuch as I used the same arrangement of rail and angle irons both ways on two separate lines with the horizontal flanges both up and down. The apparent advantage of the flange down is the greater accessibility of the bolts confining the angle irons to the rails. But this is more apparent than real, inasmuch as I never found the bolts or nuts—bedded in the ballast, the angle irons being fitted in the rail channels with an elastic curvature, compressible in screwing up—I never found them to move. They keyed firmly into the ballast by their projections. The packing, being on the surface, was easily accessible without opening out. As regarded the result of the two systems of placing the angle irons, the horizontal bearing of the angle irons above, at the ballast level, was immeasurably superior. It was perfectly steady, and kept out rain completely from below the iron, though in some localities the two rising rail heads formed a pond between them. In laying down, the practice was to bolt the rails and angle irons together, with the horizontal flanges downwards, in lengths of a quarter of a mile, and then to turn them over and connect them together, and put on the tie bars. It was remarkable in this process to observe their facility of torsion, like a long snake, notwithstanding their rigidity both vertically and horizontally when laid *in situ*. This facility of torsion is an important element in ensuring a close fit on the ballast. Another important

fact was gleaned while laying down. The form of the rail was double headed, each head 2 inches wide by $1\frac{3}{4}$ inch deep, connected by a vertical web $\frac{1}{2}$ inch thick by $3\frac{1}{2}$ inch deep, making the total depth of the rail 7 inches, while the spread of the angle irons was 13 inches, the top of the rail head rising only $2\frac{1}{4}$ inches above the bearing surface on the ballast. Thus there was a keel $4\frac{3}{4}$ inches in depth below the bearing surface, which prevented all lateral movement. It was remarked that there would be great difficulty in "slewing" such a rail; but the answer was that if once laid straight it would never want slewing, *i.e.*, side moving, a process only resorted to when the lateral action of the flanges of the engine wheels forces the line to one side, a common thing with smooth surfaced transverse sleepers. The fact ascertained while laying was, how very small a bearing surface was actually needed to sustain the rails on the ballast, when laterally and vertically stiff enough to distribute the load over long lengths. On the main line where it was laid down, there were very short intervals between the trains, and the process had to be performed rapidly; the cross sleepers and rails of the old line were removed, and the hollow sleeper pits remained open. On this about $\frac{1}{4}$ mile of the wrought iron was laid down like a long ladder, the bearing surface being only the rail edges, 2 inches in width, equal only to 52 square inches per yard run, or 635 feet super per mile. The sinking of the rails on the surface with the fast train running over them was only $\frac{1}{4}$-inch, and this did not increase with a considerable number of subsequent trains. The ultimate bearing surface when ballasted up was 11,440 feet super per mile, or 936 inches per yard run. The bearing surface of an ordinary cross sleeper rail, spaced 3 feet apart, is 12,320 feet super per mile, or 1,000 feet per yard run, but as only two-thirds of this surface is practically available, it is reduced to about 8,200 feet, or 720 inches per yard run. The inference to be drawn from this was that 10 inches in width continuous under each rail gave as much bearing surface as the cross sleeper rail, and inasmuch as it was a continuous bearing surface, eight inches would be found ample. As this iron way was laid down at the instance of Robert Stephenson and Joseph Locke, in a report to the directors of the London and North Western, it may be supposed that considerable thought had been given to it, and some practical experience. What, then, was the result? It was taken up one morning suddenly, after being in use six months; the exact reason I could never ascertain, but only that it was by order of the directors. Many reasons might be imagined. In the first place it is a nuisance to have a mile or two of experimental permanent way forming a portion of a main line, and requiring particular men to attend to it. Again, what is everybody's business is nobody's. Then there are many vested interests whose owners will continue to cry, "Great is Diana of the Ephesians." Again, the officers of the company are placed in a very invidious position. They get no credit by working the plan of a stranger if successful, and it is easy to throw the blame on them if unsuccessful. And sometimes there is at work the Scottish process known as "blawing in the big mon's lug," for "Robert is no ane o' our clan, an nae kith or kin." All these considerations act as a drag-shoe on too rapid progress, sometimes usefully and sometimes mischievously. The facts, during six months' usage, were, that it proved a much smoother road than the cross-sleeper road, and, on the whole, less noisy, though the noise was of a different kind. It was a continuous whirr, induced by the constant slip of the carriage wheels, with a rigid, minute vibration, like the scrape of a fiddle bow newly rosined, and the sensation was precisely the same on the three kinds of ballast that were used—one a loose-blowing sand; another, gravel much mixed with dirty clay; a third, large hard flint nodules, taken out of chalk, the ground being a wet clay bottom badly drained. Carriages commonly have more or less end play on their axles, and any irregularity in the rails is thus avoided. With engines little or no end play is allowed, and, consequently, with a rail literally stiff and unyielding any irregularity becomes sensible on a jar. Now these rails, 13 inches wide on the bearing surface, were perfectly rigid, and, at the same time, they were imperfectly manufactured, and there were many "kinks," or irregular curvatures. When these occur in ordinary cross-sleeper rails, the evil is corrected by sliding and packing the sleepers endwise, and this kind of keeping the line in order is a common operation of the platelayers. In the case of the iron way, they endeavoured to correct the evil in the same way, but however carefully they might do it, the first passing train restored it to its normal position. The reason was, the ordinary way, being simply plastic, had no will of its own. It simply took the position into which either the engine or the platelayer thrust it. The iron way, on the contrary, was really permanent. As it was made so it remained, and was probably the first sample of permanent way in which this condition was attained. Had it been rightly made, it would have remained in good condition till the rails were worn out. There was another consideration. The number of bolts rendered it difficult to replace a nail in the same short time as on the ordinary plan. But on the whole the advantages were obvious enough to have warranted a continuance of the system with better manufacture. As regards the wear of the rails, I do not think that it was inferior to that of ordinary way; but they were of soft iron, and of course were liable to crush. But certainly the crushing of rails is more likely to take place with unequal bearings than with those which are continuous. With regard to the so-called rigidity, I believe the notion arose chiefly from the sharp ringing sound; and if the wings or angle bearings had been laid on strips of board this would have disappeared. Still there is no doubt on my mind that a certain amount of elasticity is essential to permanence and easy running, not merely vertically, but laterally also, and this whether steel rails or iron be used. I have found in practice that longitudinal timbers, trenailed down on cross sleepers, and with the chairs spaced intermediately, with the sleepers thus resting on unpacked spaces, is the best arrangement with timber. The elasticity is thus continuous, and there is absolutely no blow; and laminated iron rails are no more liable to crush than homogeneous steel ones. But squares of cast iron or of slate, 5 inches thick and measuring about 6 feet superficial, in clay land, level with the surface, would be by far the best arrangement, and would, with great advantage and with ultimate economy, dispense with the cross sleepers of timber, and most probably with ballast also. On these the elastic longitudinals could be fixed. Mr. Juland Danvers asked why timber sleepers, used so commonly in England and on the Continent of Europe, will not answer in India. The reasons may be thus stated. First, there, is the presence of the white ant, which seems to eat up every timber but teak, and that is too valuable, and it is cheaper to import creosoted fir sleepers from Europe. Secondly, heavy tropical rains saturate the timber, and then the hot sun shrinks and splits it. White ants do not like creosote; but again, a hot sun is not favourable to creosoted timber, unless it be wholly buried in the ground. For these reasons, engineers have taken to iron sleepers in the pot form, and these sleepers, Mr. Danvers states, are apt to crack. This could be remedied, of course, by heavier metal, but that involves much extra cost in material and freight, and more than that, in the handling. If iron way is to become the rule in India, it will gradually come to be wrought iron way, and past experience has not yet convinced me that wrought iron way must necessarily be more rigid than any other way, and especially cast iron way. I believe the question to be quite soluble whenever Mr. Danvers, in his capacity of multiple director of Indian railways, shall enter upon the synthesis with the same energy and acumen that he has given to the analysis, and satisfy the Indian Government

here that a very moderate expenditure will enable them to establish a permanent type at two-thirds the cost of the existing way. A curious phase has come round in timber sleepers in England. Time was that the sleepers decayed too fast by rotting, and so creosoting was introduced, adding 25 per cent. to the cost of the sleepers. Some companies still continue to creosote all their sleepers. Others have ceased to creosote the sleepers of the main line, because the destruction has become mechanical in too short a time for decomposition to act. With regard to the comparison made between steel and iron rails, the chief difference consists in the former being homogeneous, and the latter laminated in structure. I believe that iron rails made by the Bessemer process will prove ultimately to be more desirable than steel, for steel rails, unless perfectly annealed, or else hardened and tempered throughout, are not trustworthy. A steel rail, with hard and soft portions, is very liable to break; and I am by no means sure that a hard top and soft bottom will not ultimately resolve itself into stripping. The Bessemer process, giving us the power of producing iron in any required mass, and dispensing with puddling and welding, is an enormous national benefit.—I am, &c., W. Bridges Adams.

MEETINGS FOR THE ENSUING WEEK.

Mon.....London Inst., 7. Rev. C. Maurice Davies, "On Wit and Humour—Ancient, Mediæval, and Modern."
Society of Engineers, 7½. Mr. Thos. Baldwin, "On Safety Valves."
Odontological, 7.
Farmers' Club, 5½. Discussion on the Abolition of Turnpikes, and provision for Payment of Trust Debts."
R. United Service Inst., 8½. 1. Lieut.-Gen. W. N. Hutchinson, "A light, short Gun, throwing a sharp-edged, discoidally-formed Projectile." 2. Mr. Andrew A. W. Drew, "The Working of Heavy Broadside Guns."
Royal Inst., 2. General Monthly Meeting.
Entomological, 7.
Asiatic, 3.
Victoria Inst., 8. Rev. Walter Mitchell, "On Meteors and Falling Stars."

Tues ...Civil Engineers, 8. 1. Mr. John Bourne, Discussion on "Ships of War." 2. Mr. Wm. Henry Barlow, "Description of the Clifton Suspension Bridge."
Pathological, 8.
Ethnological, 8.
Anthropological, 8.
Geologists' Assoc., 8.
Royal Inst., 3. Prof. Tyndall, "On Vibratory Motion and Sound."

Wed ...Society of Arts, 8. Discussion to be introduced by Mr. Henry Cole, C.B., "On the existing Legal Regulations in reference to the Cab Fares in the Metropolis, and their effect in rendering the Vehicles inferior to those provided in other European Capitals and the large Municipal Towns of this Country."
Geological, 8.
Pharmaceutical, 8.
R. Society of Literature, 4½.
Obstetrical, 8.

Thur ...Royal, 8½.
Antiquaries, 8½.
Linnæan, 8. 1. Messrs. J. C. de Mello and Richard Spruce, "Notes on *Papayaceæ*." 2. "On the Cultivation of the Nutmeg, &c., at Singapore."
Chemical, 8. 1. Dr. Matthiessen, "On Alloys." 2. Dr. Phipson, "On the Eggs of *Corixa mercenaria*."
R. Society Club, 6.
Artists and Amateurs, 8.
London Inst., 7. Prof. Wanklyn, "Chemistry of the Noble Metals."
Royal Inst., 3. Prof. Tyndall, "On Vibratory Motion and Sound."

Fri .....Astronomical, 3. Annual Meeting.
Royal Inst., 8. The Rev. F. W. Farrar, "On Public School Education."

Sat .....R. Inst., 3. Mr. G. A. Macfarren, "On Harmony."

Patents.

From Commissioners of Patents' Journal, January 25th.

Grants of Provisional Protection.

Animals, medication of food for—3433—J. Napier.
Artificial fuel—32—J. Bird.
Artillery and rifle practice—3323—J. W. Cusack.
Augurs—46—W. E. Newton.
Bark from woods, removing—44—W. E. Newton.
Bathing chairs—78—M. H. Simpson.
Bench planing machines—3—A. D. Campbell.
Books, materials for binding—90—F. Brampton.
Brine, raising—48—C. F. Claus.
Cards, distributing—7—H. W. Hart.
Cartridges, &c, encasing—52—E. C. Prentice.
Cast steel—88—R. Mushet.
Cloth, finishing—86—W. E. Gedge.
Crank sheds—50—W. Martin.
Elastic gussets—3451—J. and J. Miller, jun.
Elastic springs—70—E. M. Chaffee.
Engines, regulators for—3416—S. Smith and J. W. Jackson.
Fibrous yarns—1—W. and J. W. Wood.
Fire-arms and their projectiles—56—W. J. Murphy.
Fire-arms, breech-loading—3383—J. R. Cooper.
Fire-arms, breech-loading—3447—G. P. Pocock.
Forms—72—S. P. Widnall.
Fuel, combustion of—3147—T. Petitjean.
Hats—3193—T. Bayley and J. Taylor.
Knitting machines—38—I. W. Lamb.
Liquids, evaporating and concentrating—5—M. Henry.
Materials designed to receive lead pencil marks, coating for—3392—S. F. Schoonmaker.
Metal, bending—3291—T. Berney.
Metallic zinc paint—82—J. Webster, E. Deane, and W. Rumble.
Muffs—3148—E. E. Quelle.
Ornamental painting, &c.—3330—T. Titterington.
Ovens and furnaces—80—J. Tomlinson.
Penholders—74—J. Darling.
Pottery kilns—60—H. Doulton.
Printing machines, feeding paper to—9—A. McGlashan and A. Brittlebank.
Punkahs, working—34—G. Logan.
Railings—84—J. H. Johnson.
Scarfs—13—A. Ward and C. G. Virgo.
Ships at sea, obtaining power from the motion of—11—C. D. Abel.
Sifters—3422—J. Slatter.
Smoke, consuming—3001—E. Dawson.
Steel pens—3367—M. Weber.
Steering indicators—3402—N. C. Franzen.
Sugar—54—J. H. Johnson.
Tubular steam boilers—76—J. Howard and E. T. Bousfield.
Water delivery nozzles—36—E. K. Dutton.
Wearing apparel—66—A. Foucaut.
Weighing machines—68—J. Silvester.

Patents Sealed.

1947. J. P. Hubbard and C. Adams.
1951. W. Seaton.
1952. W. Stroudley.
1955. C. D. Abel.
1956. P. Griess and H. Caro.
1957. J. Phillips-Smith.
1960. W. Richards.
1970. J. J. Bodmer.
1983. G. H. Couch.
1986. S. Chatwood, and J. and T. Sturgeon.
2175. R. Tonge.
2658. F. Meyer, W. Wainwright, jun., and T. P. Pascoe.
2743. T. Wilson.
2759. G. T. Bousfield.
2810. G. T. Bousfield.
2856. J. Chubb and W. H. Chalk.
3237. G. Haseltine.

From Commissioners of Patents' Journal, January 29th.

Patents Sealed.

1963. J. McKenzie, T. Clunes, and W. Holland.
1968. J. A. Birkbeck.
1980. J. Sawyer and F. Bauman.
1982. J. Robinson.
1984. J. Parry and R. Morris.
1988. C. N. Plantrou.
1995. J. H. Johnson.
2003. N. Kilvert.
2005. T. Campbell and H. Coffey.
2007. J. H. Johnson.
2008. W. H. K. Mack.
2010. P. Murray.
2024. J. H. Johnson.
2052. W. R. Lake.
2066. W. Clark.
2104. W. Clark.
2131. S. R. Platt and E. Hartley.
2171. J. Johnson.
2427. W. Clark.
2555. G. P. Dodge.
2735. A. V. Newton.
2893. G. Haseltine.
3025. W. E. Newton.
3059. G. Haseltine.
3098. G. Haseltine.

Patents on which the Stamp Duty of £50 has been Paid.

159. H. Brockhurst & J. Sullivan.
168. J. H. Johnson.
182. T. C. Clarkson.
192. F. North.
274. D. Anderson.
187. J. Shaw.
196. J. Platt and W. Richardson.
200. E. Lucius.
212. S. Vaile.
198. W. E. Newton.
237. J. Rodgers.
218. G. Darlington.
221. J. Combe & J. H. Smalpage.
224. P. Christie.
267. J. G. Jones.
476. G. Parry.
261. J. Whitworth.
265. H. Bessemer.

Patents on which the Stamp Duty of £100 has been Paid.

166. J. Potter.
206. C. F. Varley.
226. J. Jeffreys.
257. W. Hartley.

Journal of the Society of Arts.

FRIDAY, FEBRUARY 8, 1867.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'Clock :—

February 13.—"On Artificial Illumination." By D. N. Defries, Esq.

February 20.—"On the Water Supply of London as it affects the Interests of the Consumers." By Thomas Beggs, Esq.

Cantor Lectures.

A course of Six Lectures "On Pottery and Porcelain," illustrated by specimens of various manufactures, and by photographs and diagrams, is now being delivered by William Chaffers, Esq.

Lecture IV.—Monday, February 11.

Oriental Porcelain.—China, Japan.

Lecture V.—Monday, February 18.

European Porcelain. — Italy, Germany, France, Holland, Belgium, Russia, Poland, &c.

Lecture VI.—Monday, February 25.

English Pottery and Porcelain.—Early History, continued to the beginning of the 19th century.

The lectures commence each evening at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend to each lecture. Tickets for this purpose have been issued to each member.

Art Workmanship Prizes.

In reference to the piece of *repoussé* work in iron (No. 15 in the list) to which the first prize had been awarded, the judges, Mr. Redgrave, R.A., and Mr. Digby Wyatt, met the workmen who had objected to the award (see last *Journal*, p. 162), and also Mr. Page, the successful competitor, on Tuesday morning last. It will be remembered that the objection raised was that the work was "not embossed from the flat, but struck in a cast die obtained from the plaster cast issued by the Society." After hearing explanations on both sides, the judges decided that the work was fairly beaten from a flat plate of iron, and that it was not roughly beaten into a metal mould; and they considered Mr. Page had honourably earned his reward. The judges, moreover, considered that the means of getting the first rough beating of the plate was not important; the completion of the surface as a work of Fine Art, both as to relief and art feeling, being the true desiderata of excellence.

The works sent in competition for these Prizes are now placed in the Society's Great Room for the inspection of members and their friends.

Examinations, 1867.

In addition to the prizes announced in the Programme of Examinations, the following are offered :—

The Worshipful Company of Coach and Coach Harness Makers offer a prize of £3 in Freehand Drawing, and a prize of £2 in Practical Mechanics, to the candidates who, being employed in the coachmaking trade, obtain the highest number of marks, with a certificate, in those subjects respectively.

The Worshipful Company of Goldsmiths offer three prizes—of £5, £3, and £2 respectively—to the three candidates who, being employed on works in the precious metals in any part of the United Kingdom, shall obtain from the examiners the first, second, and next highest number of marks, such prizes to be distinguished as the "Goldsmiths' Company's Prizes."

Institutions.

The following Institutions have been received into Union since the last announcement :—

Bolton, Science and Art School, Church Institute.
Hulme, Working Men's Institute.

Subscriptions.

The Christmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Cantor Lectures.

"On Pottery and Porcelain." By W. Chaffers, Esq.

Lecture III.—Monday, February 4.

Mr. Chaffers' third lecture was "On the Pottery of France and other countries." He commenced by describing the peculiar and most original ware made at Oiron, near Thouars, from 1520 to about 1550, coeval with the best period of Italian maiolica, called Henri II. ware, which is of a distinct character and ornamentation to every other class of pottery. After briefly quoting the opinions of writers on the subject during the last 30 years, he alluded to the discoveries of Mons. Fillon, who solved the problem and cleared up the mystery as to the origin of this ware. Two artists assisted in the work, a potter, named François Charpentier, and Jean Bernard, librarian and secretary of Helène de Haugest Genlis. While in her service the latter had furnished numerous designs for ornamental bookbindings. After her death they entered the service of her son, Claude Gouffier, whose arms are found on a plateau in the South Kensington Museum. Mr. Chaffers next described the monograms, which are those of the Dauphin Henri, Anne of Montmorency, and of Claude Gouffier—the arms, emblems, and devices which are found upon the pottery of Oiron. He then spoke of the distinguishing characteristics of this curious ware, the body of which is a creamy white pipe-clay, very compact and of fine texture, so that it does not, like ordinary fayence, require an opaque white enamel, but merely a transparent glaze. Instead of being painted with enamel colours over the surface, it is actually inlaid with coloured pastes, in the same manner

as the champlevé enamels or niello work on metal. The lecturer continued—I will endeavour to give some idea of the complicated process of constructing a piece of this ware, from a very careful examination of a fractured specimen in the Sèvres museum. The foundation of the vase being first modelled into the required form by hand—quite plain and hatched all over with crossed lines, that the outer crust might the better adhere to it—one or more thin plaques or bands of moist clay were then laid on a flat board, corresponding in size to the portion of the vase to be covered. These plaques were stamped by the bookbinders' tools into various patterns. The string borders of frets, guilleches, foliated scrolls, rosettes, &c., were accomplished by swivel stamps, held in the hand, and rolled from one end to the other; the interlaced arabesques and diapered grounds were produced by means of metal stamps, such as were used for gilding the leather surfaces of books. These cavities or incised patterns were then filled in with different coloured clay, the superfluous portions being removed by a sharp chisel, and the bands were applied to the shaped foundation, and pressed closely to it. The next process was the application of ornaments in relief, such as brackets, masks, shells, terminal figures, &c.; these were either modelled by hand or pressed into moulds, and stuck on to the vase, together with the handle, and placed in the kiln for the first baking. The piece was then removed, and dipped into a thin, transparent lead glaze, with here and there some enamel tints of purple, blue, green and yellow, sparingly applied, and again subjected to a less degree of heat in the muffle kiln, sufficient to melt the glaze. From the manner in which the encrusted pattern was applied round the exterior of the vase, it would be next to impossible to make it correspond exactly at the junction of the two ends. This trifling irregularity has given rise to the supposition that the ornamentation was merely a printed design, transferred to the surface of the ware. This, to a superficial observer, appears very feasible; but if we look beneath the surface, and examine the section of the fractured vase at Sèvres, it is clear that the coloured pastes were inlaid, the sharp angles of the grooves or furrows presenting too regular an appearance to have been caused by the mere absorption of any colouring matter, either by surface transfer or with a brush. It will also be observed, that the furrows in which the coloured pastes have been inserted are slightly depressed, from shrinkage in the kiln, thus essentially differing from painted earthenware, which would rather produce a low relief. The number of pieces of this ware known to be in existence is 53. They are equally divided between France and England, each possesssing 26. The odd one belongs to Russia. The lecturer next gave a detailed account of the methods adopted by the French potters in the fabrication of fayence, passing through all the gradations of mixing the clays, kneading, turning, baking, glazing, painting, &c., and the colours employed. He then gave short historical notices of the principal potteries, the products of each being exhibited, kindly lent to him by the following gentlemen:—Mr. H. G. Bohn, Mr. Durrant, Mr. Henderson, Mr. Slade, and Mr. Wareham. Beauvais was celebrated for its decorative pottery early in the fourteenth century, and is frequently alluded to in early inventories. Rabelais calls it the "Potteries Azurées;" and in the archives of Beauvais instances are recorded of presents being made to distinguished persons passing through the city. The elegant vases produced at Avignon, of quite an Italian character, were spoken of, and some of the finest examples pointed out. In speaking of François Briot, the lecturer said he was not only a goldsmith but likewise a manufacturer of fayence. His works in gold and silver have disappeared, but some of his extraordinary productions, both in pewter and in enamelled pottery, are preserved. His pottery has been erroneously attributed to Bernard Palissy, but it is a distinct manufacture, and executed by Briot in a rival establishment. The enamel is more vitreous and transparent, the colours more brilliant and of a higher finish, and resemble enamel on metal. The most celebrated specimens were referred to, viz., a circular salver, belonging to Sir E. Marwood Elton; a piece in the Fountaine Collection at Narford; another sold at the Soltykoff sale for £400; as well as some smaller pieces by the same artist. The works of the celebrated Bernard Palissy came next under review, and the various scenes in his eventful life, from his birth, in 1510, until his death in the Bastille, in 1589, briefly alluded to, and his most important works described. To give some idea of the appreciation of true pieces of Palissy at the present day, Mr. Chaffers mentioned a round basin, with Diana of Poictiers *en chasseresse*, which brought in the Soltykoff sale £292, and various other instances. Nevers was one of the most important *fabriques* of France, established in the 16th century, principally by Louis of Gonzaga, who brought from Italy expert artists in the arts of pottery, glass making, and enamel. The first potter established here, in 1578, was Dominique Conrade, of Savona, whose family continued the *fabrique*. Pierre Custode, in 1652, established another, and seven generations of this family were successively employed in it. In 1743 the number of manufactories was restricted to 12. In 1793, in consequence of the treaty of commerce between France and England, by which the English potters were enabled to pour in their earthenware at so cheap a rate that the French could not compete with them, added to which the price of lead and tin used in the glaze was raised by the English miners, all these disadvantages came so quickly upon them and upon all the *fabriques* of the South of France, that a panic ensued, and the trade of the French potters was irrecoverably ruined. In 1797, at Nevers, six had absolutely discontinued their works, and the other six were reduced to less than half their number of workmen. The different styles were then described, and some very fine specimens of the second epoch, 1660 to 1720, were exhibited, covered with a beautiful lapis lazuli blue, called "bleu de Perse." The last period, down to the French Revolution, bears evident symptoms of decay, the pieces being covered with republican emblems, revolutionary and satirical sentences, and, as works of art, below criticism. Rouen was another noted manufacture of fayence early in the 16th century. Some tiles, dated 1542, painted with historical subjects, were alluded to, preserved at Orleans House, Twickenham; and the well-known specimens of the 18th century were amply illustrated, especially some pieces of a service manufactured for Louis XIV., who, having sold his plate to defray his heavy war expenses, had a fayence service made at Rouen in the forms of birds and animals, such as were usually served at table. The well-known fayence manufactory at Strasbourg, established by J. Hanung, in 1750, called in France "Poterie du Rhin," was then spoken of, as well as the extensive potteries of Moustiers, of the 17th and 18th centuries, and the styles of all the periods distinctly pointed out and exemplified by specimens. Those of the beginning of the 18th century are the most artistic, being mostly painted in blue camaieu, with elegant arabesques, in the style of Jean Bérain, and André Boulle. Marseilles, another important manufactory, was in full activity early in the 17th century, and the names of the principal potters, and the styles of ornamentation were fully detailed. The potteries of Sinceny, Sceaux, Aprey, St. Amand, Vincennes, Sarreguemines, Niderviller, and other places in France, were also taken notice of in turn, and examples of modern French fayence of an artistic character, were exhibited, accomplished *au grande feu*, that is by one baking, at a great heat, which has this advantage, that the colours so fixed are indelible. Among modern artists may be mentioned MM. Jean, of Paris; Lavallo, of Premièrs; Deck, of Paris; E. Lessore, Rischgate, Bouquiet, &c.

Ninth Ordinary Meeting.

Wednesday, February 30th, 1867; Sir Richard Mayne, K.C.B., Commissioner of the Police of the Metropolis, in the chair.

The following candidates were proposed for election as members of the Society:—

Hawley, J. P., C.E., Lambeth Water Works, Brixton-hill, S.
Hewitt, F. K., London Joint Stock Bank, 124, Chancery-lane, W.C.
Howse, Thomas, 19, St. Paul's Church-yard, E.C.
Schofield, William W., Buckley Hall, Rochdale.
Stirling, Sir Walter, Bart, 36, Portman-square, W.

The following candidates were balloted for, and duly elected members of the Society:—

Brereton, F. S., 5, Cannon-row, Parliament-street, S.W.
Briggs, Henry R., George-yard Wharf, 36, Upper Thames-street, E.C.
Brinjes, J. F., 25, Fieldgate-street, E..
Cawston, Samuel W., Balham-hill, S.
Grisbrook, W., 154, York-road, Lambeth, S.
Stanger, C., Harley-villa, Grove-street-road, South Hackney, N.E., and 8*a*, Worship-street, E.C.

The subject introduced for discussion was—

ON THE EXISTING LEGAL REGULATIONS IN REFERENCE TO THE CAB-FARES IN THE METROPOLIS, AND THEIR EFFECT IN RENDERING THE VEHICLES INFERIOR TO THOSE PROVIDED IN OTHER EUROPEAN CAPITALS AND THE LARGE MUNICIPAL TOWNS OF THIS COUNTRY.

By Henry Cole, Esq., C.B.

Mr. Cole said for a long time past it had occurred to him that there were a multitude of subjects which might be profitably discussed by this Society, which were not of sufficient importance to warrant the formality of written papers. Moreover, there were many who, when the paper was written, were not qualified to give effect to it in reading—an art which had not been much cultivated in this country. He had put these views before the Council of the Society, and they had been induced to allow, as an experiment, for three or four evenings, the introduction of subjects without written papers. He conceived there were a number of subjects which members might like to bring forward in this manner, such as, for instance, "How far it might be possible to relieve passengers from having their baggage examined in going from England to France?" a subject of considerable interest just now. Another matter that might be suggested was "the visit of our working classes to the Paris Exhibition." We were now in the midst of contemplated plans for the building of a new National Gallery, but we had not yet determined what a National Gallery ought to contain. He thought that was another subject for discussion. There was also the employment of terra cotta in architecture, respecting which doubts were every day expressed whether it would last as well as stone. Then, again, some of the members might be able to tell them why it was that the milk and the butter of Paris were so much purer and better than those articles were in London. He merely threw out these hints to stimulate his fellow-members to assist the Council in a fair trial of this experiment. He had some trouble in framing the title of the subject which he proposed to bring before them this evening, and he might say that, as it now stood, it was not exactly his own. The question he wished to raise was not the interference of the law with the management of public vehicles, but with the question of fares. They were aware that the legislature of this country had thought fit to make a law that every cab must go for sixpence a mile. In his opinion that was a great mistake, and against the experience of almost every other city and town in the kingdom. He did not want to go into the numerous questions of law connected with cabs, or the difficulty which the public had in getting redress against overcharges and such like questions. If any one wished to master all these points he commended to their notice a little book which had been sent to him, entitled "Handy Book of the Law relating to London Cabs and Omnibuses," by William Thomas Charley. There was also another point which he did not propose to enter upon. His friend Mr. Edwin Chadwick had written long and learnedly upon the question of competition, and had endeavoured to show that cabs ought not to be a subject for competition, but that there should be some kind of general authority to determine how many cabs there should be, what kind of horses should be driven in them, and other matters of that sort. He (Mr. Cole) would not stop to inquire whether the principle of competition "for the field" of service, as opposed to competition "within the field," was the right one. Neither did he intend to advocate that cabs should be left altogether to themselves, and be under no supervision whatever. He thought it was obvious that they ought to be placed under proper superintendence. What authority should exercise that superintendence was a subject he would not enter upon. There was the Lord Mayor in one quarter, the High Bailiff of Westminster in another, and the High Bailiff of Southwark in another, and Parish Boards and magistrates in all quarters. They thus had a variety of jurisdictions, and he did not express any opinion whether they were better or worse that an united municipality. These matters he did not propose to go into. He had, however, arrived at this conviction — that on the whole, we had in London the meanest cabs in the world. He would not go so far as to say they were the worst in the world, though they were very bad indeed. They occasionally found a Hansom, which went along pretty quickly, with a good driver, who would not charge the passenger more than double the ordinary fare; but he thought if by any means they could get up an exhibition of cabs from all parts of England, and from the principal cities of Europe, and marshal them in Trafalgar-square, those of the metropolis would stand very low in the scale. He found in the tenth report of the Commissioners of Inland Revenue an account of the London cabs, which might be considered the last version of the subject. At page 15 of that report the Commissioners said:—

"It must be admitted that our four-wheeled cabs are a disgrace to the metropolis of a great empire. It must also be admitted that the duty is very heavy, and that if the post horse duty were repealed or reduced, that on hackney carriages in London could not with justice be retained in its present shape. But it is at least very uncertain whether the public would thereby obtain any improvement in the class of carriages which ply in the streets. There can be no doubt that this trade is at present in a condition almost peculiar to itself; that capital is repelled from embarking in it, and that the number of needy men who set up a single cab and drive it themselves is increasing every year, while that of the larger proprietors is diminishing. In any other kind of business this state of things would not long exist. Open competition would secure for the good cabs the most custom and the best prices, and the dirty and rickety cabs would soon vanish from our streets. But the necessary conditions for this self-adjusting process are wanting. The prices are fixed by law at a uniform rate, and the public, for the most part, rarely exercise their right of selection when a cab is called; at all events not sufficiently to drive the inferior vehicle out of the trade. Under such circumstances it would seem that the only legislation which would secure for us the class of hackney carriages which would be creditable to the metropolis is to be sought in an extension of the powers given to the police, or in a more active exercise of their present power for prohibiting the use of objectionable carriages and horses."

It might possibly be well to increase the powers of the police; but he thought it better to allow the public and the cab interest to deal with the subject as between themselves, rather than to encourage a more active exercise of police powers as the remedy. The next witness that he would quote was their excellent chairman himself. Incidentally last year the cab question was raised before the

"Select Committee on the London (City) Traffic Regulation Bill," when Sir Richard Mayne said, in reply to several questions:—"The London cabs are bad" (247), "the fares are too low" (248). "I think differently now upon that point from what I once thought. I do not think there ought to be a sixpenny fare at all. I think the lowest fare ought to be 1s." (248). "The present system is not a good one" (250.) He (Mr. Cole) would not venture to say there ought to be no sixpenny fare, but that purveyor and customer should be left free to determine whether there should be such a fare. If anybody liked to run penny cabs, he did not see why the law should prohibit his so doing. He wanted the cab proprietors and the public to be allowed to settle the matter between themselves; and the mode in which that might be done he would endeavour to explain by-and-bye. He would only trouble them with one more witness on this part of the subject. Mr. Fitzroy, speaking in support of the Bill of 1853, had said:—

"In no capital of Europe were such carriages so entirely removed from all efficient control and supervision as in London. The consequence was a crowd of vehicles of a very inferior description, and with horses that had been graphically described by our first living novelist as only kept upon their legs by the rickety vehicles to which they were attached. The fare demanded for their use was excessively exorbitant. No change had been made in that fare since its first introduction in 1831. Amid the general—he might say universal—tendency towards reduction in articles of general consumption, two things had hitherto successfully resisted the tendency. One was the pint of extraordinary compound still called by courtesy a bottle of wine at an inn, and the other the fare paid per mile for the use of a hack cab. We were now arrived at a time when there was every reason for reducing that fare by at least 25 per cent., and he should therefore propose that it be fixed at 6d. per mile. Without giving any other reason, the decrease in the price of forage was alone sufficient to justify this. Oats, which in April, 1831, cost 23s. 10d., were now at 19s. 8d., having fallen between 20 and 25 per cent. But independent of the exorbitant amount of the fare, there were great objections to its nature in consequence of the broken money involved in the question. If you took a cab for a mile, you hardly dare meet the torrent of abuse that would be levelled at you if you failed to pay the driver 1s., and the consequence was that instead of 8d. the fare was 1s.; besides which, the hirers had no satisfactory means of ascertaining the distance they were taken."

He ventured to say that the supposed remedies administered by the Bill of 1853 had not given them the cabs which the legislature doubtless thought they would have had by this time. His own experience with respect to the four-wheeled cab was, that it was a rarity to get a good one. The cushions were rarely all of one colour, and on a wet day they were seldom dry. To find a button on the window, by which to lower the sash, was a happy accident. Draughty they were both above and below, and so shaky and noisy that conversation within them was carried on with great difficulty. The Hansoms were certainly quicker than the others, but they were extremely tight-fitting for two persons even of moderate bulk. No one could enter a Hansom without getting dirt on his clothes from the wheels, and the garments of ladies became besmeared with mud. Then if it rained there was the risk of having one's nose shaved off by the glass front being suddenly let down. Further, the springs were often weak and rickety, and he had travelled in many which made him feel as sick as going from Dover to Calais. To suppose these were matters which Sir Richard Mayne could investigate was out of the question; therefore there must be some other remedy found for them. His own experience was that the cabs were better in Birmingham and Liverpool, and very much better in Edinburgh. He was told that one reason for that in the latter city was that gentlemen did not usually keep their own carriages, because of the hills, and they found it better to hire public vehicles. Moreover, they got very superior cabs at Paris; and at Vienna they had a still better choice of vehicles. In London for open air driving they could only have the hansom cab, which was most inconvenient for ladies, whereas in Paris it was a common thing to see ladies reclining in an open vehicle called a Victoria, with four wheels, and a very pleasant kind of carriage it was. Why were there no such things in London? Owing, in his opinion, to the arbitrary interference of the legislature in fixing the amount of fares. All matters of buying and selling should be left between the producer and the consumer; the interference of the law in attempting to settle the price of things was against all sound political economy. He quite agreed with Sir Richard Mayne that a sixpenny fare was not a paying fare. In Birmingham he found a carriage on four wheels was entitled to charge 1s. for under a mile, if on two wheels, 8d. In Cheltenham, for a distance under a mile, 1s. was paid; with two horses it was something more. In Edinburgh the system was a little more complicated, but the pith of it was that one could travel half a mile in an ordinary carriage for sixpence. Going to Liverpool, he found two persons could travel a mile for 1s., and there (as was also the practice in London) a table of fares was placed inside the vehicle. In Manchester, where they might expect to see the full development of free trade in carriages as in other things, when anyone wished to start a cab he applied to the municipal authorities, to whom he stated at what prices he intended to run. Having declared that, he was bound to have the figures painted not less than an inch in height on the inside of the cab; that was all the authorities required. The average fare in that city was about 9d. per mile for two persons, and 1s. for more. He would now just call attention to the rate of fares and the working of the cab system abroad. In Munich there were two kinds of public vehicles—one called a drosky, and the other a fiaker. In Vienna there were three kinds of vehicles—one being the fiacre, and another a very superior carriage, which was used by the higher classes, the drivers being elegantly clad. In Brussels there were two kinds of public vehicles—the cab and the fiacre, the fares varying. In Dresden they had the fiacre and the drosky, the fares varying also according to the number of persons carried. He now came to a striking example, which he hoped all present would examine for themselves in the course of this year—the system in Paris. In that city they had a considerable variety of fares. Previous to last year he believed the public carriage business in Paris was a kind of monopoly, being chiefly in the hands of a company, who arranged to carry out the service according to the wishes of the municipality of Paris; but in 1866 the Emperor and his ministers came to the conclusion that it would be desirable to have cabs at different fares, so as to give the public a choice. They had two modes of charging in each description of carriage—one by the "course," and the other by the hour. The highest fare for the course was two francs, and for the hour 2·50 francs. When a person entered a vehicle the driver at once handed him a ticket, and did not want to be asked for it, as in London. Moreover, the inconvenience of the London system was avoided in cases of dispute. Here a man was dragged from a distance to appear at a police-court and prosecute a charge of overfare, and even then no settled decision had been come to by the magistrates as a body on various points. Mr. Cole here produced and read several cards issued by the various cab companies in Paris to their drivers, showing the variety of fares, 1 fr., 1 fr. 10 c., 1 fr. 40 c., 1 fr. 50 c., and 1 fr. 80 c. the course, and the same variety for the hour. In addition to them there was another class of vehicles in Paris at higher fares, called *voitures de remise*. These, instead of standing in the open streets for hire, were kept at certain intervals under cover, and a person hiring one of them was sure of a dry as well as a comfortable vehicle. With respect to the Manchester system, which might be called the free trade system in cabs, he had received a letter from the Town Clerk, who wrote:—

"It may be perhaps rather difficult to say that our present Cab Regulations Act is producing good and clean vehicles. I do not, however, think they are any worse than when the fares were in fact fixed by the Council. I do think the leaving the fixing of the fares to the cab proprietors has this good effect, that it does away with all ground of complaint that they are too low, or otherwise unsatisfactory. As a matter of fact, however, there is an uniform rate—9d. per mile for two, and 1s. per mile for three or four passengers."

A letter had been received from a lady, expressing a hope that Mr. Cole would "explain why no open carriages ply for hire in London, as they do in other cities of Europe, as ladies are obliged to drive about in Hansom cabs, from the difficulty of getting open carriages, under two days' notice, from livery stables." If that lady did him the honour to read what he stated this evening she would find that her wishes had been met. The choice they had at present resolved itself into this—they must either put up with the Hansom or the four-wheeler, or they must hire a vehicle from a livery stable, for which they must pay 2s. 6d. per hour, and the driver expected a shilling. To return to the subject of Mr. Fitzroy's Bill of 1853, Mr. Fitzroy, as above quoted, had said that he thought the eightpenny fare was exorbitant. and had proposed a reduction of 25 per cent. Just imagine the law stepping in, and telling people in any particular trade that they must reduce their charges by 25 per cent! Was it not preposterous that the Legislature should step in, and, by an Act of Parliament, say a person should be compelled to do his business at a reduced price? Nothing could be more opposed to all sound political economy. The Bill did not pass, however, without considerable discussion, and he would read to them some portions of it. One of the opponents of the Bill had said:—

"The bill was in violation of the very principle which his honourable friend and his colleagues prided themselves upon, namely, that of free trade, for it sought to adopt a maximum and minimum of wages which a particular class of the community should be entitled to receive."

And who did they think it was who uttered that sound sentiment? It was not Mr. Bright, but Sir Robert Inglis, one of the most staunch protectionists this country ever produced, and yet, when this measure was in the House, he had the courage to oppose it. He wanted to have the Bill referred to a committee, but the House of Commons desired the sixpenny fare, and they would not hear of it. Mr. Beckett Denison, who used to be called a Tory, was of opinion that the Bill ought to be sent before a Select Committee, as the only means of giving the cab proprietors an opportunity of stating their own case. He thought the House was not a competent tribunal to decide the matter without hearing the other side. But Sir R. Inglis and Mr. B. Denison were joined in this matter by no other person than Mr. Bright, who, speaking upon this Bill in 1853, said:—

"If he had not heard from the hon. gentleman (Mr. Fitzroy) an expression of great willingness to receive suggestions upon points of detail from both sides of the House, he would rather have seen the bill referred to a select committee. He thought, as most hon. members were great cab riders, and experienced personally therefore the inconveniences of the present system, they ought to be careful not to allow their individual annoyances to influence them in legislating upon this subject. In his opinion the unfortunate condition of cabs in the metropolis was to be attributed very much to the want of a proper municipal government in London. At present the drivers were exposed in our streets to all the vicissitudes of our often most inclement weather, whereas under proper municipal government the cab-stands would have been placed in wide streets, under a glass roof, where the men would have been sheltered from the weather. By this and similar arrangements a great improvement would have been effected in the characters of the drivers and of the vehicles."

He (Mr. Cole) must say he entirely agreed with the opinions expressed on this subject by the gentleman whose remarks he had just quoted. The view he now ventured to lay before the meeting was this, that it was desirable that the legislature should cease to meddle in such petty matters as this. He thought they had something else to do than to settle at what price a cab was to run. He was quite certain, if they took any further measures in this direction, it should be to leave the trade as free as possible, so that the competition might be as great as possible. He knew there had always been a great tendency towards this parliamentary meddling with the coaching traffic of the country. In the days of the old coaches and hackney-carriages, each interest was protected by penalties against the other for infringement of each others rights, in respect of the conveyance of passengers within certain limits of distance from the metropolis. The hackney-coach was liable to a fine for going beyond certain distances, and the coach proprietors could not take up passengers within the hackney-coach limits. He approved of the continuance of the system of granting licences to cab-drivers, and that some authority should be in force to keep them to their bargain, as a guarantee, as far as possible, against imposition upon the public; but, at the same time, the cabowner must be the best judge of the price at which he could sell his article. He was aware there were practical difficulties in the way of carrying out this measure, but he thought they might be got over. They had different classes of railway travelling, which worked exceedingly well, and he saw no reason why the same system should not be applied to cab fares. The difficulties might be greater in London, from its peculiar circumstances, than in any other city. It might be a long time before they arrived at municipal government in the metropolis, but in the meantime they might get rid of that objectionable Act of 1853, fixing the uniform fare. He would not alter the present law in other respects. He did not advocate free-trade principles in this business without giving the public a remedy against extortionate cab-drivers. He therefore ventured to recommend the Council of this Society to urge upon the Government to appoint a committee to inquire into the whole subject of the hackney coach traffic. The Society had already done much for the improvement of the Patent Laws; of the laws of Art Copyright; as well as many other things of a similar nature; and he had no doubt if they were to take up this subject they would succeed in getting rid of the present unsound legislation, and thus aid in providing the London public with vehicles of a better class and in greater variety.

Mr. Hill said, when this subject was announced for discussion he expected it would have embraced a larger area than had been taken by Mr. Cole in his address. He had shut out every other consideration except that of fares, the point objected to being their limitation by law. It was the case in most of the Continental cities, and in the principal towns (and especially the watering-places) of England, that a municipal regulation of the cab fares existed. If it were argued that the cab business in London was unremunerative, because of the low fares, they ought to endeavour to see how it could be made more remunerative. He thought that would not necessarily follow from increasing the fares. The question was how they could create a larger demand for cabs on the part of the public. At present, from some cause or other, there was a disinclination to use cabs, and he mentioned cases under his own observation in which people arriving at a railway terminus preferred walking to their destination, even in wet weather, to the detriment of valuable clothing, rather than take a cab. He believed this repugnance to cabs arose, in the first place—especially in the case of ladies—from the frequent disputes that took place about fares. A remedy for this, to a great extent, would be found by some instrument being attached to the cab, by which the distance travelled would be indicated, and he thought it was quite within the province of this Society to endeavour to obtain such an instrument and get it adopted. He had no doubt cabs would be more generally used by the public if some means were provided whereby the disputes with cabmen could be avoided.

Mr. Alderman Lawrence, M.P., felt much indebted to Mr. Cole for having brought this subject before the Society, because, though at present it might seem a small matter, yet it was in reality a large question, affecting the comfort and convenience of great numbers of people; not the inhabitants of London alone, but those who visited the metropolis from all parts of the world. He considered it was incumbent upon them to endeavour to provide in this metropolis as good accommodation in respect of public conveyances, as was to be met with in the great continental cities. The evils of the present

system of cab traffic were universally admitted, and the evidence on all sides went to prove the fact. It was alleged that capital was not largely embarked in this branch of business: that was simply because it did not pay to put capital into it. Irrespective of the question of fares, there was another matter which bore materially on the subject. The Chancellor of the Exchequer exacted a large amount annually from the cab proprietors of London—a tax from which the same class in the provinces was exempted. In London there was a tax levied of a shilling per day on every cab, which was only remitted in respect of cabs which did not work on Sundays. In the country they merely paid the post-horse duty on a certain scale, according to the number of horses and carriages kept. Last year, when the Chancellor of the Exchequer reduced the duty on omnibuses, he also reduced the post-horse duty, which before went by jumps, and gave an unfair advantage to those who had a large number of horses and carriages. Up to last year, when the duty of one penny per mile existed upon omnibuses, calculating each omnibus to run 320 or 330 days in the year, it paid something like £66 per annum. That was reduced from £66 to one fourth, or £16 10s. Each omnibus employed eight or nine horses, and a cab only two, yet the cab was saddled with a tax of a shilling per day, which, for six days in the week, amounted to about the same sum as that paid by an omnibus under the reduced scale. Not only was there this undue pressure of taxation upon cabs, but the legislature had reduced the fare to a very low amount. Under the extended police regulations with regard to cabs which were provided for by the Act of 1853, it was expected that a great improvement would have taken place as regarded the vehicles, the horses, and the appearance of the drivers; but the reduction of the fare caused the cab business to dwindle down, the horses and vehicles were worse, and the drivers were men of a lower grade; and it continued to dwindle down till it was found to be an unremunerative investment of capital. There was another grievance under which cabmen laboured. In the metropolis the cabman who neglected to pay the owner for the daily hire of the cab was liable to arrest for the debt, and summary process before a magistrate led to his committal to prison for a certain number of days. In Whitecross-street prison there were generally from five to twenty such prisoners. Such a system of arrest and imprisonment was, in the present day, wholly exceptional. What was the consequence of this system as regarded the public? The cabowner, knowing he had this summary power over the men, took less trouble than he would have done to inquire into their characters, and the driver, knowing there was a prison before him in case he did not keep up his payments to the owner, extorted as much as he could from the public, in the way of over fare. All these things operated in the end against the public. If the fare was too low to be remunerative, the tariff ought to be revised by Parliament. The Home-office had taken this matter under its control, and it was their duty to see that the public were well served. This, he believed, was the only matter in the metropolis which the Government had taken into its own hands; and with all the progress of local management, it had never permitted the Corporation of London, or the local authorities of any of the districts of the metropolis, to interfere with the settlement of the regulations for the management of hackney carriages; and in his opinion this management was as bad as it could be. The question now was as to the remedy. It appeared to him that the first step was to place the public carriages of the metropolis in as a fair position as those of the large provincial towns, and remove from them the present excessive taxation. He believed that with this burden the present fares were somewhat too low, but if the taxes were reduced, he thought they might retain the sixpenny fare; at the same time the public should have the opportunity of engaging a superior class of carriage at an increased price. He could not agree with Mr. Cole that anybody who chose should be allowed to start cabs at any fares they thought proper to fix. He approved of the suggestion that a superior class of vehicle should be provided at a higher scale of fares—an arrangement which would largely promote the convenience of the public.

Mr. C. Sanders, who introduced himself as being formerly a cab proprietor in Paris, enumerated the various classes of public vehicles now employed in that city, and the rates of fares charged for them.

Mr. Frederick Hill said some years ago, being a member of the Society for Promoting the Amendment of the Law, he made inquiries into this subject, with a view of introducing it for discussion before that society, and the result of those inquiries brought him to the same conclusion as that which Mr. Cole had arrived at; viz., that the interference of the law in the matter of cab-fares was a mistake. In many similar matters the law formerly interfered, but that interference had been gradually withdrawn; and they had proof of the wisdom of that step in the fact that in no one instance, as far as he was aware, had it ever been proposed to re-establish legal interference whenever it had been abandoned. That, he thought, was a great encouragement to them to go forward in the same direction, and apply that principle in the case of cabs. If there were any who thought otherwise, it was incumbent on them to make out their case on the other side of the question. With regard to the effects of the unequal taxation alluded to by Mr. Alderman Lawrence, what in the natural state of things was the effect of imposing a tax upon an article? It was that the price of the article to the consumer was enhanced. If a heavy tax was laid upon cabs the customer had to pay something more; the owner of the article was only injured to the extent that the increased cost of it probably led to a less demand on the part of the public. It was stated that in no case were good cabs to be obtained without a suitable tariff of fares. Mr. Cole had referred to Manchester as a place in which the cab system was very admirably worked, and he could strongly confirm that statement. Those who visited that place, at the Social Science Congress, could not fail to have witnessed the excellence of the system there, more especially the short distances that intervened between the cab stands. There were other evils of the present system in London which had not been touched upon. One great disadvantage arising from the absurd attempts of the legislature to undertake the task of determining what should be the market price, under all the varieties of cost, of an article was this—that it drove the business into the hands of a low class of people. They (the cabmen) were often dishonest, and to his own knowledge foreigners especially were fleeced to an enormous extent, while an honest cabman could hardly make a living. Although he was obliged to ride in cabs a good deal, he always did so with reluctance. He had frequently left articles in cabs, but he never knew an instance in which his property had been returned to him, and he was in the habit of often submitting to overcharge in order to avoid contention.

Mr. Webber said there was one point omitted in the discussion in connection with the reluctance of the public to use cabs in London, and that was the crowded state of the traffic. If it were a question of time whether one should walk from Regent-street to the City or take a cab, he thought the decision would be in favour of walking. He referred to the damage which was inflicted upon trade conveyances in localities like Ludgate-hill and the bottom of Fleet-street, and expressed his opinion that the operations of the police-officers at that point of intersection of the immense traffic were rather productive of confusion than otherwise. He thought, as affecting the extent of the employment of cabs by the public, the circulation of the traffic was an important element, and it was a paramount duty on the part of the authorities to provide a remedy for this evil.

Mr. W. Botly expressed his concurrence with most of what had fallen from Mr. Cole, and agreed that the less of legislative interference there was in a matter of this kind the better. With regard to the honesty of cabmen as a class, his own experience had been of an opposite kind to that mentioned by Mr. Hill.

Sir Cusack Roney said they had heard a good deal this evening about the bad state of the cabs and the questionable character of the cabmen. Although travelling a great deal in their vehicles he had not been so unlucky as some gentlemen who had spoken, and he generally found the men were satisfied with the proper fare, or a little above it. As to the honesty of the men as a class, though he did not appear there as their advocate, he would remark that no one was in a better position to give an opinion on this point than the Chairman. Many instances were given in the police reports of robberies having been frustrated through the integrity of cabmen. Only the other day the Assistant-judge highly complimented a cabman for his great honesty and integrity in a case that came before him. He (Sir C. Roney) had been twenty-five years connected with railways, and on his first becoming connected with them, a member of the board of which he was then secretary said to him, "Now, remember this—the persons travelling up and down your line will tell you that it is the worst managed railway in the kingdom; and if you go to another line the people travelling by it will tell you the same of that line." He had travelled abroad a great deal, and he could tell them that foreign cabmen were not the specimens of immaculate perfection which some people imagined them to be; the cab-drivers of Brussels, and even of Paris, knew as well how to overcharge foreigners as any English cabman did. He believed the only place in which there were really honest cabmen was Dublin, of which he was a native. He might mention that the word "fiacre" was derived from the fact that in the year 1650 a man of the name of Beauvois obtained a license to work hackney carriages in Paris, and he resided at a house called the Hotel de St. Fiacre, and from that circumstance the hackney carriages were called fiacres. St. Fiacre was an Irishman of noble family; in fact, descended from Irish kings; he went to Paris in the seventh century, and his reputation there was of the most saintly character. He would not, at this late hour, trouble them with any further observations.

Mr. Elt, in reference to the remarks of the last speaker, had great pleasure in bearing his testimony to the integrity, civility, and intelligence of the car-drivers in Dublin. With respect to the general question, he gave his emphatic thanks to Mr. Cole for his advocacy of free-trade in cabs under proper regulations. He thought as a class the cab-proprietors as well as drivers were placed under many disadvantages. Omnibuses were allowed to fix their own fares, and, as had been the case during the late severe frost, to increase them 50 or 100 per cent. A Hansom cab, which could carry only two passengers, and had consequently never an opportunity of charging for extra passengers or luggage, was at a disadvantage as compared with the four-wheeled vehicles, capable of carrying four persons and a considerable quantity of luggage, for which extra fare could legally be demanded. He suggested the desirability of the employment of a tell-tale to indicate the distances travelled, so as to avoid all disputes with the drivers.

Mr. Campin, with reference to the taxation imposed upon cabs, thought that was to a certain extent compensated by the privilege they had of standing for hire in public places. That was a thing which took the case out of the ordinary course of trade, a special privilege being thus conferred.

Mr. Hartley, in reference to the tax of 1s. per day upon cabs, would ask whether the chairman did not consider that was a great inducement to the Government to license as many cabs as possible for the sake of the revenue, and whether, under such circumstances, the number of cabs might not be unduly multiplied.

The Chairman, in closing the discussion, said, as to the Government having any interest in the number of cabs, that never entered into their calculation. There was no limit fixed to the number of licenses which were granted by the Board of Inland Revenue, upon an undertaking being given for the payment of the duty. Under the Act of 1853, which had been rather severely dealt with that evening, it was required that it should be certified by the Commissioner of Police that the vehicles licensed were, in all respects, in a fit condition for public use; but that regulation was evaded in many instances by another cab than that which was licensed being submitted to the police inspector, and the certificate thus fraudulently obtained. He agreed with Sir Cusack Roney that the car-drivers in Dublin were a very civil and honest set of men in general. He considered the system of fares by the "course" the one best calculated to avoid disputes; but he believed that to be inapplicable in a place of the vast extent of London, though, at the same time, payment by distance must necessarily lead to disputes, and, in the case of strangers, to overcharge. Mr. Cole had put into his hand a description of a tell-tale instrument, made at Birmingham; but whether it was an apparatus adequate for the purpose he was not able to say; if it was so, its use would, no doubt, be a great benefit. Several such contrivances had been brought under his notice at different times, but he had no legal power to compel cab owners to make use of them, and there was an universal feeling on the part of such persons against their adoption. He was sure all present must have been gratified by the spirit in which this discussion had been carried on, and the intelligence and consideration that had been displayed throughout. One thing he thought had been clearly shown, viz.:—that whilst it was easy to make complaints, when they came to the attempt to discover the remedy, the task was one of great difficulty. The only town in which the principle of free-trade in this business was adopted was Manchester, and there it had only lately been tried—so lately, he believed, as the year 1865—and so far as he gathered from Mr. Cole's statement, this had resulted in the establishment of two classes of vehicles, the fares not being regulated according to the quality of the carriage, but according to the number of persons to be carried. That, he thought, was not the object sought to be gained. The object was, that they should have two classes of fares—one for persons who wished to travel at the cheapest rate, not caring much about the equipment and convenience of the vehicle, and the other for a carriage of a superior kind. It might be difficult to arrive at this result, but that it was desirable to attempt it he felt most strongly. He believed an opportunity would be afforded shortly in Parliament in connexion with the Bill that was to be introduced this session with regard to street traffic, for suggesting some alterations with respect to cabs and cab-fares, and he was sure the official authorities by whom that Bill would be brought into the House would be willing to listen to any proposals that were likely to benefit the public. He would make one additional observation in justice to the cabmen, who, he must say, in very many cases, were extremely hardly dealt with. Cases frequently came within his knowledge in which he thought the law had been pressed very rigorously—not to use a stronger term—against them. With regard to their honesty as a class, anybody who took the trouble to inquire at Scotland-yard would find that hundreds of deposits of lost articles were made there, and there was scarcely a day passed in which such property was not restored to the owners, sometimes to the value of several hundreds of pounds. He thought it was only fair to state this in justice to a class of men who were often undeservedly maligned.

Sir Cusack Roney writes as follows:—Feeling that I

was not entitled, at the late hour at which I addressed the meeting of the Society of Arts last evening, to occupy its attention for more than four or five minutes, and also feeling it an act of justice to offer some observations in defence of London cabmen, I was unable to speak upon the points which I had intended to bring under notice. Perhaps I may now do so by letter to you. All experience in every city, as well in England (with one exception) as on the Continent, shows the necessity of having a fixed tariff for public vehicles. Were it otherwise, the extortion to which the public, but especially females and strangers, would be subjected would be endless. The variety of public carriages stated to exist in Paris may be agreeable, but it is perplexing even to persons well acquainted with the city. For example, it was stated at the meeting that there are carriages to hold two persons at 1 franc 50 centimes the "course," and carriages at 1 franc 80 centimes. But these carriages are identical, the fact being that if a person takes one from a public stand, or in the street, the fare is 1 franc 50 centimes, but if a person takes the self-same carriage at the under-cover stand, or *porte-cochere*, the fare is 1 franc 80 centimes. There are no less than three different tariffs for *voitures à quatre places*. These varieties of fares render it almost impossible for strangers, especially those not conversant with Paris and with the French language, to understand them; and even with such knowledge people are not always able to do so. The only city, I believe, in Europe, in which the owner of a public carriage may fix his own fares, is Manchester. This is called free trade, and it may be so, but it does not bring with it the usual concomitants of free trade, which are increased business and diminished prices, for the prices of cab-hire in Manchester are at least as high as in the other commercial cities of Europe; and as regards the cabs, the horses, and the drivers, they are not superior to those in Liverpool, Birmingham, &c. But Manchester itself is a city that possesses two monopolies of the most complete character—the supply of water and of gas. These belong to the Corporation, which largely relieves local rates out of the profits derived from these two sources. The arrangement is, no doubt, an extremely good one, both for the city and for the inhabitants, and it is one that might perhaps be beneficially employed elsewhere, but it is manifestly not "Free Trade." London cab-owners labour under a disadvantage not shared in by their brethren of any other city or town, whether metropolitan or provincial, in Europe. They alone are not permitted to charge extra fares during certain hours of the night. Usually such fares are double, but they are never less than an addition of two-thirds of the day fare. Individually I believe that if the minimum fare were one shilling, and the oppressive irregularities so well pointed out by Mr. Alderman Lawrence, M.P., were removed, the cab standard would be greatly improved, and the public would have a vehicle that on the whole would fairly fulfil the ordinary wants of the public. If we ascend to the regions of luxury we must pay accordingly. The practical operation of the sixpenny fare has been to raise *in limine* an antagonism between the cab-owner and cab-hirer, especially with that portion of the community whom it is necessary to protect. But, truth must be told; cabmen will invariably tell any person who converses with them on the fare question that for one man who pays sixpence twenty females will avail themselves of the rate, and in those cases an exact mile is usually extremely well known. The present law as regards more than two persons riding in cabs, and payment for luggage is, undoubtedly, beneficial to the cab-owner.

PARIS EXHIBITION, 1867.

The last four weeks have produced a great change in the appearance of affairs in the Champ de Mars; the grand vestibule, or nave of the building, is finished as regards the material portions and most of the painting and glazing also. This vestibule forms the division between the French department on the left hand, and the English on the right, and is to be devoted principally to the illustration of the history of the earth. But the grand vestibule will not be the lion of the exhibition of 1867; its roof is heavy and inelegant, and no ingenuity in the way of decoration is likely to produce much effect. The sides are too much enclosed, and the clerestory windows being at a great height from the ground, the lower portion will be too much in shadow. The feature of the building is the great machinery court; compared with this, the vestibule is nothing.

The mode of colouring adopted cannot be said to be fortunate; in the machine gallery the tones are too flat, and the main lines are not sufficiently indicated. There is a patchiness about the decoration of the interior of the roof which is peculiarly disagreeable; the great pillars, on the contrary, being painted simply of white or light cream colour, relieved by vermillion, look bold and well. The outside of the building is being coloured dark red, with panels and lines in maroon, or reddish brown, but the effect is poor and flat. Artists have not yet learned how to colour acres of iron work, and no wonder; it is a problem probably without a solution, from an artistic point of view.

The heavy chocolate colour of the intermediate courts is fatiguing to the eye, but as our neighbours are covering it all up with wood work it matters but little.

A curious contrast will be presented by the English department, which will be totally different from all the other portions of the exhibittion; the whole of the iron work in the British industrial courts, and the walls of the picture gallery, have been painted of a dull green colour inclining towards olive. There is no doubt that this tint will suit works of art admirably, and it promises to harmonise well with the dark red colour selected for the counters. The contrast will be rendered still greater by the fact that while the French and many of the other industrial courts will form series of rooms rather than galleries, the British department will present a large space with scarcely anything to obstruct the view but the objects exhibited; and, while other countries group their exhibits in a more or less artistic manner, the British exhibitors will act independently and doubtless show considerable diversity. The contrast will be instructive in more ways than one, and in that view its existence is an advantage.

The Russian department presents a third aspect which deserves notice; the commission, like that of England, has kept the whole of its space unobstructed by walls, partitions, or enclosures of any kind, except rails three feet high, while its entire fittings are harmonious. The commission has, in fact, made the woodwork of its court a magnificent exhibition of the peculiar style of the ornamental furniture of the country. There is a series of noble presses, with boldly-executed pillars and pilasters, enormously massive tables, square, octagonal, and oblong, with legs, brackets and pedestals to correspond, stands for glass cases, and the cases themselves, all in perfect keeping, not only with each other, but also with the massive wooden railing which surrounds the entire court. The whole of these are formed of ordinary wood, the decorated portions being of the same material as the solid parts. The ornaments are of the mixed Byzantine and Greek style proper to Russia, and are nearly all produced by the saw; there is no carving whatever employed; end-pieces, knobs, and other parts are turned, but all the rest of the ornament consists either of open pierced work, or of the same laid on the framework of the furniture, thus producing bold raised patterns. It is not usual to colour or even varnish such furniture, but the hollows are generally painted in positive colours, and the whole of the surface left of the natural colour of the wood.

Two other foreign courts also begin to exhibit a

peculiar and characteristic appearance. The Turkish and Egyptian department is divided into compartments, each having a decorative frieze in plaster work; while the Danubian principalities—Moldavia and Wallachia—present a series of kiosks, or rather verandahs, for they only project a few feet from the wall, decorated with interlaced ornaments in brilliant colours, heightened by gilding.

The English department has now got to work. The sappers have covered the floor with well-known names, and cases, tables, and counters are being rapidly got into their places. London is first in the field, Mr. Drew having opened the campaign with forty cases of fittings a day or two since. A court is being prepared for the musical instruments, and there is little doubt that in a very short time there will be few square feet vacant on the British side. The commission has brought over a steam traversing crane, in order to expedite the getting in of the heavy goods, a contribution towards the means of preparation for which our neighbours ought to be grateful, as no doubt they are.

The preceding leads naturally to an admirable arrangement of the Imperial Commission itself, and which was incompletely noticed in the *Journal* on a former occasion, namely, the service railway of the exhibition. A line is laid down entirely around and close to the building, as well as around the interior of the great machinery court; two branches connect these concentric lines with the railway station just outside the grounds, while small connecting lines join the two circles at the principal entrances of the building, all the junctions being supplied with turntables. This complete system is permanent, that is to say, for the whole term of the exhibition. When the preparatory work is all done, the rails will all be filled in and covered with gravel, or otherwise, and so remain until wanted again for the dispersion of the contents of the exhibition.

The arrangements for the convenience of visitors are as remarkable as that just mentioned in connection with the work of the exhibition, and deserve special notice. In the first place there are no less than fifteen gates, or rather entrances, to the grounds of the exhibition, and sixteen doors to the building itself. Of the former, twelve lead from the surrounding roads, two from the river, beneath the quay, and one from the railway station. As already stated, those who arrive by rail will be able to reach the building by a long corridor running half the length of the park; on the opposite side, the arrangement for those who arrive in carriages is still more admirable. The straight side of the building is only about 360 feet long, and includes three entrance doors, while the slip of ground between it and the road is little more than a hundred feet wide. The commission has taken good advantage of these circumstances. A light wooden erection, as long as the side of the building, and as high as the surrounding *marquise*, has been constructed with three transverse roofs leading to the three doorways, so that carriages will set down under shelter, and the visitors may enter by either of the three cross passages. The intervals between these passages, or rather corridors—for the sides will, apparently, not be enclosed—are to be planted with flowers.

The great size and complicated form of the building and grounds render it necessary to give names to the various avenues and promenades; thus we have within the building the streets of England, India, Russia, Africa, Spain, Austria, Prussia, Belgium, Holland, France and several of its provinces, while the central avenue in the grounds is called the Avenue d'Europe, and the principal promenade the Chemin Circulaire des Deux Mondes; the other walks are named in like manner—avenues of Germany, United States, the East, and Burgundy; and alleys of Scotland, Ireland, Japan, Morocco, Tunis, Brittany, and so on throughout.

The various portions of the building are being marked outside by immense painted boards, one for each of the sixteen sectors of the building, thus:—"No. 13" contains "Italy, Turkey, Egypt, China, Japan, Siam, and Africa;" while Nos. 16, 15, and half of 14, are occupied by great Britain and Ireland.

The grounds are not at present in a condition for the promenade, except in navvy's boots, but the works are going on with great rapidity. Nearly all the buildings on the French side are finished, and the others are generally in a finished state. The most conspicuous are the mosque of the Sultan and the temple and kiosk of the Viceroy of Egypt, forming one group; the pavilions of the Bey of Tunis and the Emperor of Morocco; the highly curious model-houses and other buildings of Russia; the house of Gustavus Vasa, in Delecarlia; the Swiss restaurant; and the fine-art galleries of Belgium and Holland. These are all finished, or nearly so, but their description must be reserved for a future occasion.

The twelve boiler houses will all be finished shortly—steam was got up a few days since in one of the French boilers; those of Messrs. Galloway, of Manchester, are now being placed in position.

Another department of the Exhibition is progressing rapidly, namely, the botanical garden; the main work of the great aquariums is all but finished, the iron framework of the great glasshouse is in place, and several smaller ones are built, and ready for glazing; the artificial canal is completed, and in some parts of the garden the flower-beds are formed, and the paths gravelled.

The preparations for the refreshment of the world exceed almost any other department in their proportions. In the alimentary court, under the great *marquise*, there are now constructing five French, three or four English, one Russian, and several other *cafés*, *restaurants*, buffets, &c.; in the grounds there will be Austrian, Swiss, Italian, Egyptian, and, it is said, Chinese places of refreshment; and lastly, by the side of the river, are two other very large *restaurants*.

INDUSTRIAL EXHIBITION OF THE NORTH-WEST PROVINCES OF INDIA AT AGRA.

This exhibition, which is the largest and most complete that has taken place in India, has just been opened. The following is the official announcement as to its objects and the prizes offered:—

The object of the exhibition is to bring together, for show and competition, cattle and other live stock, agricultural implements and machinery, articles of Indian agricultural and forest produce, and specimens of industrial manufacture and art; also to afford an opportunity for comparison between the productions of the north-western provinces, Oude, and the dominions of the chiefs of Central India and Rajpootana.

The exhibition will be arranged in five departments, viz.:—

I.—Live stock.
II.—Agricultural and animal products.
III.—Forest and mineral products.
IV.—Machinery and implements.
V.—Arts and manufactures.

These departments will be severally subdivided as shown in the classified list appended.

The exhibition will be opened on Monday, the 4th of February, and will be closed on Saturday evening, the 9th. On both the above days an entrance fee of one rupee will be paid by all except the members of the central committee, the curators, jurors, and members of district and divisional committees. On the intermediate days the exhibition will be free to all.

The exhibition will be open to competitors from all parts of India.

Prize List of the North-Western Provinces Industrial Exhibition, to be held at Agra, commencing February 4th, 1867.

Departments, Classes, &c.

Department I.—Live Stock.

Class 1.—Horned cattle, 4,500 rupees.

Class 2.—Horses and mules, 3,250 rupees.
Class 3.—Sheep and goats, 1,400 rupees.
Class 4.—Elephants, 300 rupees.
Class 5.—Camels, 150 rupees.
Class 6.—Poultry, pigeons, and rabbits, 500 rupees.
Prizes for Department I., 10,100 rupees; first-class medals, 20; silver ditto, 63.

Department II.—Agricultural and Animal Products.

SECTION A.—RAW.

Class 1.—Country dairy produce, 200 rupees.
Class 2.—Grain, 450 rupees.
Class 3.—Pulse, 350 rupees.
Class 4.—Tubers, 400 rupees.
Class 5.—Fibres, 500 rupees.
Class 6.—Cotton and wool, 500 rupees.
Class 7.—Silk (raw) and silkworms, 100 rupees.
Class 8.—Dyes, 250 rupees.
Class 9.—Oil seeds, 90 rupees.
Class 10.—Tobacco in leaf, 80 rupees.
Class 11.—Sugar-cane and raw sugar, 50 rupees.
Class 12.—Honey and wax, 30 rupees.

SECTION B.—MANUFACTURED.

Class 13.—Tea, 400 rupees.
Class 14.—Tobacco, 150 rupees.
Class 15.—Sugars, 150 rupees.
Class 16.—Preserves, 200 rupees.
Class 17.—Oils, 100 rupees.
Class 18.—Drugs, 100 rupees.
Class 19.—Country-brewed malt liquor, 50 rupees.
Class 20.—Spirits, 50 rupees.
Class 21.—Perfumes, 100 rupees.
Class 22.—All other products pertaining to this department not already enumerated, 200 rupees.
Prizes for Department II., 4,500 rupees; first-class medals, 5; silver ditto, 50.

Department III.—Materials used in Construction and Forest Produce.

Class 1.—Specimens of timber, 150 rupees.
Class 2.—Ditto stone for building, 150 rupees.
Class 3.—Ditto lime and kunkar, 75 rupees.
Class 4.—Iron, copper, &c., 300 rupees.
Class 5.—Jungle fibres, 25 rupees.
Class 6.—Saltpetre, 50 rupees.
Class 7.—Gumlac, 50 rupees.
Class 8.—All other forest products not enumerated above, 200 rupees.
Prizes for Department III., 1,000 rupees; first-class medals, 2; silver ditto, 8.

Department IV.—Machinery and Implements.

Class 1.—Native engines, 1,000 rupees.
Class 2.—Implements for tillage, 500 rupees.
Class 3.—Hoeing, drilling, and sowing machines, 100 rupees.
Class 4.—Harvesting machines, 100 rupees.
Class 5.—Implements for preparing produce for market, 650 rupees.
Class 6.—Farm yard implements, 150 rupees.
Class 7.—Machinery and implements for irrigation, 800 rupees.
Class 8.—Agricultural carriage, harness, and gear, 350 rupees.
Class 9.—Dairy implements, 100 rupees.
Class 10.—All other implements and machinery used for agricultural or kitchen purposes not entered above, 250 rupees.
Prizes for Department IV., 4,000 rupees; first-class medals, 3; silver ditto, 15.

Department V.—Arts and Manufactures.

SECTION A.—MANUFACTURES.

Class 1.—Cotton fabrics, 1,000 rupees.
Class 2.—Woollen ditto, 1,000 rupees.
Class 3.—Silk ditto, 850 rupees.
Class 4.—Embroidered ditto, 650 rupees.
Class 5.—Fibrous manufactures, 500 rupees.
Class 6.—Jewellery, 400 rupees.
Class 7.—Hardware and cutlery, 200 rupees.
Class 8.—Porcelain and pottery (bricks, tiles, &c.), 200 rupees.
Class 9.—Glass manufacture, 150 rupees.
Class 10.—Furniture and upholstery, 250 rupees.
Class 11.—Ornamental carving in wood, ivory, stone, 100 rupees.
Class 12.—Inlaid work in marble, wood, &c., 200 rupees.
Class 13.—Leather manufactures, 500 rupees.
Class 14.—Paper of country manufacture, 150 rupees.
Class 15.—Fancy work in paper, wax, worsted, bamboo, cane, beads, &c., 100 rupees.
Class 16.—Arms and accoutrements, 200 rupees.
Class 17.—Conveyances, 400 rupees.
Class 18.—Thermantidotes, punkahs, tattee watering appliances, and all other house-cooling apparatus, 500 rupees.
Class 19.—Tents, 400 rupees.
Class 20*a*.—All other manufactures, not included in the above, 400 rupees.

SECTION B.—FINE ARTS.

Class 20*b*.—Models and statuary, 500 rupees.
Class 21.—Engraving, printing, and lithography, 200 rupees.
Class 22.—Photography, 400 rupees.
Class 23.—Manuscripts, drawing, and painting, 300 rupees.
Class 24.—Specimens of other fine arts, 150 rupees.

SECTION C.

Class 25.—Machinery, and all other instruments used in arts and manufactures, and for scientific purposes, 300 rupees.
Prizes for Department V., 10,000 rupees; first-class medals, 30; silver ditto, 100.

A FOREIGNER'S VIEW OF ENGLISH RAILWAY MANAGEMENT.

The following extracts from a letter to the *Kölnische Zeitung*, will give Englishmen some notion of the appearance of their country from a German standpoint:—

Speaking of a journey to Chester by the London and North Western, he says, "The neighbourhood of London thus far is uninteresting. It is true there is plenty of bright green meadow land, which is rarely absent in the midland and southern counties, but otherwise the country is flat, tame, and monotonous. Charming landscapes, however, would fail to attract attention, if in passing by Harrow and Rugby one were to reflect how little is taught and learnt in these celebrated schools, how miserably, on the whole, school education is managed in England, and how difficult it is to solve the riddle how so many able, learned, practical, and renowned men should have gone forth from these monastic, richly-endowed, flogging schools (Prügelschulen), in which there is nothing solid but the leg of mutton and the old customs.

How much, to give only one instance, could not the managers of English railways learn from the Germans, and these again from the English! I do not mean in great things, such as the construction of locomotives, tunnelling, bridges, signalling—for these things are so important that the engineers of both countries are always on the watch trying to spy out all improvements—but I refer to small things which are useful to the company's servants and travelling public, without necessitating any expense worth speaking of. For many years, and especially since the robbery and assault by Müller, Englishmen have been racking their brains to discover the best means of communication between the passengers, guard, and driver. They have made endless experiments, with this object in view, with all sorts of neat but complicated and expensive apparatus, some electrical, some with concave mirrors, others with

rockets, but up to the present time most railways have not got beyond the experimental stage. Very few companies have adopted the simple cord from the guard's van at the end of the train to the whistle on the engine, because it causes too much delay if carriages have to be put on or taken off at intermediate stations. No company has yet been able to make up its mind to the footboard running all the way along outside the carriages, which qualifies the Prussian guards for peripatetics. Such an arrangement would prevent many a stoppage at a station, and would furnish an easy means of controlling the tickets; besides, professional murderers would feel somewhat uneasy at the thought that they might have uninvited witnesses of their deeds in the guards passing backwards and forwards. The knowing ones here, who otherwise are not usually frightened by dangerous arrangements, assert that this walking would be too unsafe, and that the English tunnels would not offer sufficient room for it—an assertion which applies to the Underground Railway in London, but not to most other railways in the country. Instead of borrowing from the Continent an arrangement which has been proved to be, if not absolutely the most fit, at all events one that has answered the purpose for many years, they still go here experimenting and disputing. In this way years may roll by, and in the meantime men full of promise may be seriously injured or lose their lives.

It is just the same story with regard to the important question of smoking. Is smoking to be permitted on railways? How shall it be allowed and how shall it be prohibited? In what way can the desires of the smoker be satisfied without inconvenience to the non-smoker? Have the directors really the power to dictate to passengers what kind of smoke, smell, or perfume they shall inhale and exhale? Is the cigar under certain circumstances merely troublesome, or must it also be considered dangerous, as the possible cause of a fire? Is one non-smoking saint to be allowed to interdict smoking to seven heretics shut up with him in the same carriage, or is it to be reasonably expected that he should allow himself to be smoked like a ham? Good heavens! Put a smoking carriage to each train, as has been the custom on the Continent since railways were introduced, and then all difficulties are removed. But no, that is too simple; and up to the present time few English railway companies have copied the Continent in this respect. Amongst them is the South-Eastern, probably because, on account of its geographical position, it is the most accessible to Continental influences.

The arrangements with regard to passengers' luggage are remarkably primitive on very many English railways, if not on all. The luggage is neither registered nor booked; at the very most a label is stuck on it, with the name of the place of destination. Arrived there, each passenger drags out of the heap of trunks, portmanteaus, and boxes, those that he recognises as his own. The railway officials all the time give up all idea of troubling themselves about control, and if mistakes occur—What are your eyes for if you can't recognise your own hatbox? It is a continual miracle that all the trunks in Great Britain have not long ago been stolen—the only explanation of the phenomenon is, that the genius of the English thieves has been greatly overrated.

Again, no arrangements are made to keep out the troublesome dust; and Belgium, which otherwise is somewhat behindhand in railway matters, is almost the only country where I have met with the frames, with fine green wire gauze, which afford capital protection against the dust in summer time, when the windows are open. A want still more felt is that of some means of heating in winter time. Of late years foot-warmers, filled with hot sand or water, are provided, at all events for persons who are known, but they are by no means generally introduced; and although our winters here are mild compared with those of the Continent in the same latitude, still, in the chilly, foggy, early morning one feels the cold quite as intensely here as there. The French carry out the heating of the carriages in the most thorough manner; and in spite of their *esprit* they are more stiffnecked in many things than many other nations who are blessed with less *esprit*. I look back even now with delight at a great deed which was done many years ago in sight of Boulogne, and I will tell the story for the good of mankind.

It was in the beginning of March. A warm day, quite out of place according to the almanack, had been followed by a sultry night when I got into the train at Boulogne, on my way to Paris. In the same carriage with me were several Normans, whose ancestors did not cross the Channel with the Conqueror, and a downy-faced Englishman, who smelt of Oxford or Cambridge. As becomes respectable travellers, we had just exchanged our innermost thoughts respecting the unusual closeness of the March night, when the door was opened, and one of the well-known metal foot-warmers pushed in between our feet. The first was quickly followed by a second. "Otez cela, s'il vous plâit," said one of the Frenchmen to the officious porter. "On étouffe," remarked another very civilly to him. But all in vain. All our protests, which increased more and more as the troublesome things under our feet became more powerfully felt, were useless against the opposition of all the officials of the Boulogne station, who unanimously declared that until further orders the heating of the carriages was "de rigueur," and that the fatal footstools would have to be regularly delivered up at the next station. "En avant!" The door was banged to, and away we went out into the dark night, with the pleasant prospect of arriving in Paris half stewed. The only one who had not joined in our protest was the tall, downy-faced Englishman. "Nature has given storks a horny covering to the legs," thought I to myself, as excuse for his passiveness. Suddenly he bent down his body to the floor, as if he wanted to snap up a frog with his beak, seized the long foot-warmer with a strong arm, and quietly threw it out of the window over the embankment. The second also followed with a crash. "That'll do," said he, with a polite bow, more to himself than to us. "That'll do," I replied, laughing. The Frenchmen said nothing, but looked with an air of fear at the bold youth who had dared to do such a deed in spite of the authorities. It was only gradually that they recovered their ease. "If they ask us what has become of the foot-warmers we will say they melted from the great heat," remarked one, who, evidently, was very much afraid of a possible inquisition. "Or we can try and get the first word," said a second, "and complain, without being asked, that they gave us no foot-warmers at Boulogne." However, no questions were asked at the following stations, and we arrived at Paris without being stewed. May the memory of the resolute youth be blessed. A great future awaits him. Perhaps already he has got a lucrative sinecure, which—leaving on one side a little immortality—is, after all, the final aim of every active and energetic man.

Fine Arts.

Exhibition of Works of Bellangé.—A collective exhibition of the works of the late Hippolyte Bellangé has been arranged by the committee of the Association of Artists, Sculptors, Architects, Engravers and Designers, and is now open at the Ecole des Beaux Arts in Paris. The collection comprises eighty paintings and one hundred and twenty water colour drawings and sketches, and presents a curious pictorial tableau of the episodes of the wars of France, from the time of the campaigns of the Rhine and the Sambre-et-Meuse, down to Solferino. The two pictures of the battles of Fleurus and Wagram, belonging to the Versailles Gallery, and that of the Old Guard at Waterloo, now the property of the Emperor,

and which attracted so much attention at the Paris *salon* last spring, are included in the exhibition. This collection is highly attractive, not only from the high talent of Bellangé, but also as an illustration of the art of a bygone period, to which he was so large and popular a contributor.

The Exhibition at Pau.—It is only very recently that exhibitions of works of art have been attempted in the Pyrenees, yet that now open at Pau includes three hundred and twenty fine pictures, many of them the work of well-known Parisian artists, Accard, Boulangé, Bourgeois, Claude, Doze, Hebert, Jeanron, Thomas, and Zo amongst the number, another illustration of the general dissemination of a taste for art in France.

Art in Rome.—Ancient works of art are not permitted to be removed from Rome without special permission, and the record of such permissions supplies annually a list of exports. It appears that the whole of the old paintings allowed to be sent away during the past year were valued at less than £1,600, and the ancient sculpture at less than £2,600. The importation of the works of modern artists was very much larger, the paintings being valued at £29,852, and the sculpture at £66,948. The whole exports of the year exceeded those of 1855 by £24,000.

The New Museum of the City of Paris.—The Paris authorities have secured some remarkable works for their new museum, namely, seven sketches by Eugene Delacroix, four appertaining to the ceiling painted by that artist in the Hotel de Ville, and the others to a similar work, one of the chapels of Saint Sulpice. The sketches of this kind by Delacroix are in many cases highly-finished drawings, and probably exhibit more of the true genius of the artist than any other of his works.

Manufactures.

The Chassepot Gun.—Some trials of the Chassepot gun have lately been made at Versailles by the Chasseurs of the Garde. The following details on this new weapon will be interesting. The Chassepot gun carries 1,000 metres with astonishing precision; it is furnished with a kind of india-rubber stopper, that hermetically closes the chamber of the barrel. The needle is very short. This gun can be fired fifteen times a minute; but in practice it is limited to eight; beyond this number would be dangerous, as regards accuracy of aim, and using up the ammunition too quickly. The gun is very light, weighing only four kilogrammes; the form is elegant, and the stock adapts itself perfectly to the shoulder. The ball is very small; this is an advantage, as a greater number of cartridges may be carried. At the end of the barrel a sword bayonet is fixed. The Chassepot gun is superior to the celebrated Prussian needle gun, which only carries 400 metres; the needle, also, of the Prussian gun is too long and easily broken. The soldiers of the Chasseurs-à-pied, being now accustomed to the gun, have obtained wonderful results with it, especially at 1,000 metres range; at this distance the bull's-eye has been hit no less than thirty times out of a hundred.

Commerce.

Products of California.—A lake of borax has lately been discovered in California, which will probably produce a complete revolution in the commerce of this chemical substance. The Californians likewise are turning their attention to agricultural pursuits, and begin to cultivate the olive. They state that their olive oil will soon rival the finest Italian oil.

Reported Adulteration of German Sugar.—In a letter addressed to a Lisle journal, by M. B. Corenwinder, a manufacturing chemist, of Habourdin, Nord, France, the writer says:—"A French merchant forwarded me, a few days ago, a sample of some sugar received from Magdeburg, and wished me to analyse it. The peculiar taste of the sugar, which in appearance was equal to No. 12, excited my curiosity, and led me to fulfil the wish of my correspondent. I find that it contains an unusually large proportion of saline matters, the result of the analysis being as follows:—Water, 5 per cent.; sugar, 75 per cent.; the rest (20 per cent.) was composed of saline substances, the greater part of which was made up of chloride of potassium. It occurred at once to me that the large proportion of saline matter could not have possibly existed in the beet, and that it must have been added to the sugar after manufacture, with a fraudulent intention. Perhaps you are not aware that in the environs of Magdeburg, at Strassfurt, there exists a mine rich in chloride of potassium, and that this salt, which is admitted duty-free into France, undersells the potash extracted from our own beet. Refined chloride of potassium now fetches at Magdeburg 17frs. the 100 kilogrammes, but can be had at a much lower price if unpurified. This coincidence leads me to suppose that the salts added to the sugar are procured from the mine at Strassfurt. The fraud is owing to an evasion of the German laws regulating the sugar duties, for the duty in the Zollverein is charged upon the raw beetroot, and the German merchant, when exporting sugar, has a right to a drawback calculated on a yield of 8·70 per cent., and amounting to 21frs. 50c. the 100 kilogrammes. I will not now consider whether this drawback is equivalent to the rate of duty charged on the beetroot, or whether it is actually a disguised bounty to exporters, but merely wish to point out the large profit the German maker would enjoy if he could make us accept sugar like that which I have just analysed. It is evident that if, on the exportation of 100 kilogrammes of sugar, a drawback of 21frs. 50c. is given to the merchant, 20 kilogrammes of the saline matter, when mixed with the sugar, would obtain a drawback of 4frs. 30c., from which the higher cost of the raw material has alone to be deducted." In commenting upon this, the *Produce Markets Review* says:—"M. Corenwinder appears to think, at the conclusion of his letter, that it is at any rate partially owing to adulteration that the German makers have been able to undersell the French in their own markets. The editor of *Le Propagateur* remarks, in a foot-note, that the fraud M. Corenwinder points out is not an isolated case, and that persons engaged in the German trade know that the sugars often contain a more or less considerable proportion of saline matters. All we can say is that we have heard of no such instance in England, and that the fraud would be so easily detected by the taste, that to engage in it would not only be dishonest, but foolishly so. There are black sheep in all communities, and the honourable body of German sugar manufacturers owe it to themselves to discover and put an end to the nefarious practices complained of in France, if they have any existance in reality. For ourselves we are inclined to think that the mixture of salt complained of must have been accidental, or it would have been discovered in England, where a considerable trade has been done in German sugars."

The Co-operative System in Switzerland.—The high price of the common necessaries of life in Switzerland has given rise to the establishment of many co-operative societies, for the supply of articles of food and other ordinary matters, and the principle is being gradually applied in other ways. Besides the societies already alluded to, there are co-operations for the supply of work-room, light, and heat, on moderate terms; societies for the fabrication of various articles by associated artizans; and lastly, credit and loan societies. The first named class is, however, the only one which has been carried out to any great extent; the others are but just rising into popularity. Those societies which confine themselves to the supply of their own members only with the necessaries of life, have not produced any noticeable result, while those which supply the public in

general, and serve as savings' banks for the associated members, have produced a marked effect on the retail trades, and they grow rapidly in importance by the re-investment of dividends. The one grand difficulty at the threshold, which is at the same time one of the greatest benefits, is the necessity of enforcing all payments in cash. The society of Lausaune is of the former limited kind; its total business in 1864 only amounted to about £7,000, and its profits to less than £350; and in 1865 they were both considerably less in amount. On the other hand the society of Zurich, which is on the broader basis, does business to the extent of about £43,000 a year, and makes a clear profit of about two per cent. The Zurich society is the most important of its class, the next being those of Vevey and Neuchâtel; but there are many others, and their number increases daily. The credit societies progress rapidly, and promise to be of great importance to the labouring population. They are founded on the German principle, and the associated bank of Zurich has a capital in shares of a million of francs (£40,000). The Union Vaudoise of Lausanne, founded on the plan of the Belgian banks of credit, was received with great favour; it commenced in 1864 with a capital of £16,000, which had grown last year to £72,864, the number of members being 519. The savings' bank department had 328 depositors. The total amount of business done during the year was about six millions of francs, and the profit ten thousand. Each member of the association takes shares to the amount of the credit granted to him, and this latter is fixed by the admission committee, consisting of nine members, three of whom retire every three months, and are not immediately re-eligible. The general council appoints the director and all the other paid officials; the general meeting is held every six months, when dividends and calls are decided upon. The effect of these societies on the condition and habits of the Swiss working classes is expected to be very important.

The Norwegian Herring Fishery.—Although the herring fishery is not the most important that is carried on off the coast of Norway as regards the capital that is required, it is, however, one which is carried on along the greatest extent of coast, and which employs the greatest number of hands. This fishery is divided into three distinct branches—that of the winter or spring herring, the summer herring, and the sprat fishery. It is difficult to know what becomes of the herring during the time that it disappears from the coasts, and the causes of the inexplicable changes that take place in the time and places of its re-appearance. One thing is certain, that this fish sometimes suddenly quits the waters that it is in the habit of frequenting, and returns again in the same sudden manner. This took place, for instance, on the coast of Sweden in the year 1808, when the herring suddenly disappeared, and since then has never re-appeared in any quantity; and by a remarkable coincidence great herring fisheries were commenced on the coast of Norway the same year. The herring fishery has from the most remote times been mentioned as one of the principal sources of existence and prosperity of the Scandinavian peninsula. In the ninth century history records abundant fisheries, and towards the year 1416 it mentions the use of salt for the purpose of curing the herring. In the sixteenth century upwards of 100,000 tons of herrings were exported from Marstrand, near Gothenburg; in 1567 the fish completely disappeared, and it was not until about the year 1700 that mention was made of them again. At the present time the herring is principally found off the coast of Norway, between Stadtland and Lindesnœs. The most important fisheries are carried on south of Bergen, round the Island of Karmoe, the small isles Fœo and Rovœr, and along the coast of the main land, from Hangesund to Sletten. The fishing population of the Norwegian coast are superstitious, and believe that the result of the fishery may be foretold by means of certain signs or omens. Thus the appearance of whales in the autumn is a sign of an abundant fishery in the following spring. A still more certain indication is the appearance of a small fish. Finally, the appearance of the herring is announced by the quantity of seagulls that follow them eagerly, and feed on them. The best season for fishing begins in the month of January, and continues to about the end of March. Last year the herrings appeared in great quantities on the southern coast of the Island of Karmoe, and at Kinn, in the northern district, and the fish in these two places are very plentiful. Altogether the results have been far superior to those of former years, and may be estimated at 750,000 barrels, of which 600,000 have been salted for exportation, the remainder represents the home consumption. The average price per barrel on the spot has been from 10 to 11 marks (about ten shillings). Some months later the fish was sold in the ports on the Baltic at from 20s. to 23s. per barrel. About 7,040 fishing boats, manned by 35,000 fishermen, took part last year in the herring fishery, and about 15,000 men may be estimated as employed on shore for curing, salting, &c. This fishery is encouraged, and a sum of money has recently been voted for the construction of lighthouses; the telegraphic lines on the coast have been greatly extended, and the fishermen have taken advantage of this means to know of the arrival of the fish. Notice is posted up daily at the various telegraph stations by the inspectors concerning the appearance of the shoals of fish, and it is a strange sight to witness the departure of thousands of fishermen, buyers, salters, &c., with their boats, barrels, and various utensils, hastening to some distant place named by the telegraph. The fishermen seem to appreciate this means of communication; and when the result of the fishery is principally due to it, they give the name of "telegraph herrings" to the fish. Every morning, at each station, notices are posted up by the inspectors as to the quantity of fish caught and the price paid per barrel. Two kinds of nets are chiefly used for catching herrings—the drift nets, of which from twenty to five and twenty are carried by each boat, with four or five men; the stop net, which has been used in Norway since 1820. This latter fishery is carried on with three nets, which each require a separate boat. It is much more uncertain than the other, and requires a much larger stock, but sometimes it gives much greater results. Amongst the principal export markets for the herring, Sweden and Russia stand first, then Prussia and the Baltic ports. The consumption of England varies from year to year, and principally depends on the result of the fishery on the coast of Scotland.

Citric Acid is made from the juice of fruits of the citron tribe, principally from the *Citrus acidus* (the lime of the tropics), the *Citrus limonium*, or lemon, and the *Citrus bergamia*, or bergamot lemon, the former containing the most citric acid, and the latter the least. The juice used in the manufacture is imported from Sicily in a highly concentrated state, its market value varying greatly, viz., from £15 to £30 per pipe. The average annual imports from Sicily have been 200,000 gallons. After the rind has been used for the separation of its essential oil, the juice is expressed from the fruit and evaporated to about one-sixth of its original bulk, previous to shipment. In the shipment of limejuice from the West Indies, the concentration is carried still further, the juice of five tons of fruit being reduced to the dimensions of a fifty gallon cask. The acid is separated from the impurities with which it is associated in the juice by Scheele's process of combination with lime, and subsequent decomposition by sulphuric acid. The commercial product consists of pure white transparent crystals, very soluble in water, and of an agreable acid taste, and the amount annually manufactured approaches 300 tons. From the varying yield of the lemon crop of Sicily the price of citric acid is subject to corresponding fluctuations, and has ranged during the last seven years from £150 to £300 per ton. The chief commercial uses of this

substance are in the manufacture of cooling drinks, in dyeing, and calico printing.

Colonies.

Population of Victoria.—The estimated population of Victoria, on the 30th September, 1866, was 638,988 persons—being 363,204 males and 275,784 females. The gain to the colony by excess of immigration over emigration was, during the previous quarter ending on the above date, 1,729—viz., 796 males and 933 females. In the former quarter the net gain by the same means was, 1,215, viz., 851 males and 364 females.

Customs Duties in Victoria.—An agitation has been going on in the northern districts of Victoria with a view to the abolition of the border customs. Meetings were held, and strongly-worded resolutions adopted, the residents on both sides of the river protesting against the injustice done to them. The points on which the most stress was laid are, that the system now in operation, by preventing the free traffic of intercolonial produce, is a heavy tax on the people of the districts, impeding trade in general, and is regarded by all classes of the community as an insufferable and unnecessary burden, and that, as the Victorian Government is willing to accede to any fair proposal for compensation to relieve the inhabitants of the border districts from this oppressive taxation, the New South Wales Government ought at once to come to some different arrangement.

Lobsters.—Fine lobsters are said to have been found in the waters of the Murrumbidgee. In flavour they are said to be fully equal, if not superior, to the marine species.

Distress in New South Wales.—A Sydney paper states that there were recently some 2,000 men in Sydney who were unable to obtain employment; and that the number of persons in indigent circumstances was not less than 7,000.

Trade of Melbourne.—The following is a statement of the imports and exports at the port of Melbourne up to November 17, 1866, compared with the same period of the former year:—

Years.	Imports.	Exports.
1866	£12,233,454	£9,711,677
1865	11,003,004	9,432,067

showing an increase of £123,045 in the imports, and of £289,610 in the exports.

Victorian Railways. — The following statement shows the total revenue for passengers, goods, and cattle traffic on the Victorian Government railways for the month of October:—

Lines.	Passengers, Parcels, &c.	Goods.	Total.
	£ s. d.	£ s. d.	£ s. d.
Murray River	9,459 10 6	23,440 13 8	32,900 4 2
Williamstown	1,154 8 11	2,123 12 8	3,278 1 7
Ballarat	8,691 19 4	10,284 14 5	18,976 13 9

Root Crops in Victoria.—The cultivation of mangold has hitherto been attended with great success in the colony of Victoria, and is rapidly extending. Like the cultivation of grass, the growth of mangolds is evidence of the change for the better which agriculture is undergoing in that colony—becoming more systematic and varied, and combining the feeding of stock with the growth of cereals. An agricultural distillery, recently erected by an enterprising firm, has given an impetus to the production of beet and mangolds. They manufacture spirits from the roots, leaving the pulp, when deprived of its saccharine, available as an excellent food for cattle.

Products of West Australia.—There is said to be an almost inexhaustible quantity of iron ore, of good quality, a profusion of copper and lead, and coal in abundance, all of good quality. Silver, antimony, &c., are also known to exist, but for want of capital little has hitherto been done. Some of the timber is of great value. The jarrah, or native mahogany, is peculiar to West Australia. If cut at the proper season, when the sap is down, it is believed to be one of the most enduring of all woods. It is much used in India and the colonies for railway sleepers, telegraph posts, dock gates, &c. Vessels have been entirely constructed of this wood, which appear not to have required copper sheathing. It is also valuable for ornamental purposes.

New Zealand Coal.—From Dr. Hector's report on the coal deposits of New Zealand, it appears that no seams have yet been discovered that can be referred to palæozoic coal measures, such as occur in the northern hemisphere; all the formations which contain workable seams appear to belong to the secondary and tertiary epochs, but the quality of some of the coal is excellent. The coals of this colony have been divided into two parts, the hydrous and the anhydrous, the former having a large percentage of water in combination with them, and the latter, which are of a better kind, being comparatively dry. The hydrous coal is largely distributed throughout these islands, and, although it has its defects, it is a most valuable fuel. In one field a bed extends over 45 square miles, and is already being worked; the total quantity of coal is estimated to be 100 millions of tons. The anhydrous coals of New Zealand resemble those of England and Australia, but are not quite so tough and solid as they should be for steam coal.

North Australia.—The liberal terms offered by the Government of Western Australia, and the inducements held out by the Government of Queensland, appear to be doing much for the settlement of North Australia. They are causing *bonâ fide* settlements to be established to the west and to the east, and the pastoral lands between the Victoria and the De Gray rivers are being occupied by squatters, who, if they fail in one part of the country, perseveringly push on to another. Whilst the colony of South Australia has been sending ship after ship round to Adams' Bay, without any important result, the Queensland squatters have been gradually grazing their way to the Gulf of Carpentaria, and are establishing stations, towns, and depôts all along the coast.

Publications Issued.

A Dictionary of Photography. Edited by Thomas Sutton, B.A., and George Dawson, M.A. (*Sampson Low and Co.*)—The first edition of the "Dictionary of Photography," published in 1858, has been out of print for several years. In consequence of this, and the continued demand for the work, the publishers have entrusted the present editors with its entire supervision, in the belief that a new edition would be a desirable boon to photographers, by supplying them with a book of easy reference, in an alphabetical form, whereby they will be saved the trouble of wading through elaborate and often badly-arranged treatises to find information on the subject to which they wish to refer. It has been the desire of the editors to condense rather than to expand the matter contained in this volume, and to make it as thoroughly practical as possible. With this object in view, they have eliminated the debatable theories and speculative articles, which occupied a prominent position, especially in the first part of the previous edition, and they have abridged other articles which, at the present time, are of less importance to photographers than they were in the year 1858. In lieu thereof, a great deal of practical matter has been added, including

all the new useful processes; many of the original articles have been re-written, in a spirit more consistent with the present advanced state of the art; the preparation and properties of the necessary chemicals, and the theory and construction of the different optical instruments required have been succinctly described; but a detailed account of the different kinds of cameras, printing-frames, stands, and some other photographic items has not been given, because a complete description of what can be seen at any photographic warehouse would be entirely out of place in a work of this kind, and would have occupied too much space. The aim of the editors has been to make this work a photographic *multum in parvo*. The work is illustrated with numerous diagrams; it contains 390 pages.

Notes.

Population of the Principal Towns of France.—The following is the population of ten of the principal towns of France:—Paris, 1,825,484, the population of which has doubled since 1841; Lyons, 323,954; Marseilles, 300,131; Bordeaux, 194,241; Lille, 154,779; Toulouse, 126,936; Nantes, 111,956; Rouen, 100,671; Saint-Etienne, 96,620; Strasbourg, 84,167.

Popular Education in France.—The municipal council of Clermont-Ferrand has taken a step which will probably have a great influence on the question of popular education. It has, by a recent vote, thrown all the communal schools of the town open without question or qualification. There is a considerable party in France in favour of the American system of gratuitous primary education, and the vote of the council of Clermont-Ferrand is an important step in that direction.

The United States and the Paris Exhibition.—A correspondent of the *Times*, writing from Philadelphia, says:—On January 17 the ship *Mercury* cleared from New York, for Havre, with a cargo of goods for the Paris Exposition. This is the second cargo sent from the United States, and it embraces goods from every part of the country, among them being an American street-railway car, an Illinois school-house built in sections, California gold and silver ores, a Western farm-house in sections, Indiana Indian corn-stalks, 17ft. high, a Philadelphia machine for planing and working iron, weighing 40 tons, a Vermont stone-cutting machine, used in quarries in lieu of blasting, Connecticut breech-loading rifles, a Massachusetts steam bakery, which makes bread without the use of any man power, a vast number of agricultural implements, artificial arms, legs, teeth, and eyes, an American army waggon which was in Sherman's famous "march to the sea," a glass plough—not a model, but a working plough—and two 15-inch cannon. Another vessel will probably be chartered to convey American contributions, and from Toronto it is announced that there will be about 400 Canadian contributors to the exposition.

Post-office at the Paris Exhibition.—"The directors of the Paris Post-office," says the *Journal des Postes*, "are taking final measures to meet the considerable requirements occasioned by the influx of strangers during the exhibition. In a pavilion situated in the Champ de Mars, near the central monument, part of which is devoted to the telegraph business, a post-office is being installed to comprise all the branches of the service. The clerks on duty are chosen from amongst those who speak several languages. The office will be opened on March 1 at latest, in the interest of exhibitors who have arrived beforehand to superintend their installations."

American Railway Travelling.—The *Western Railroad Gazette* says:—The laying of a third rail on the Canada Great Western Railway has just completed a route of uniform gauge between this city (Chicago) and New York and Boston. The inaugural train introduced us to some luxurious novelties of travel. Among them was an hotel car with a little kitchen. At each seat tables can at once be put up, and on the passenger touching a bell-cord a servant promptly responds with a bill of fare, from which the traveller selects such edibles as best suit him, and is presently enjoying all the comforts of an admirably-cooked and served meal, while going at the rate of forty miles an hour. Two palace-sleeping cars, the "Mayflower" and the "City of Detroit," also went through without change. Each contains six sofa and twenty-six seats. The finest Wilton carpeting covers the floor; the wood-work is all black walnut, carved and inlaid with gilt; windows and ceiling are ornamented in the Moorish style; mirrors hang opposite each seat; tables for eating, writing, and playing are ready at hand; curtains made to order and imported cover the windows, and the room in the daytime resembles an elegant parlour. But, when night comes on, a few moments change the scene, and luxurious beds for sixty-four people appear, with costly hair mattresses and pillows, and clean—absolutely clean—sheets and coverings. In the morning each passenger is handed his separate towel, hot and cold water are ready in convenient washrooms at each end, and he finds himself refreshed and comfortable hundreds of miles from where he retired to rest in this flying hotel. An even and gentle heat is diffused from one of Westlake's heaters beneath the floor, and pure ventilation is effected by openings below, through which the air is brought in pipes from the roof, and diffused through the car, escaping at the ceiling when found to be impure. All the metal work inside is plated with silver, and a bright light is diffused at night from great lamps pendant from the ceiling. The cars run on two trucks of eight wheels each, and the motion is so smooth that a person can easily write while going at full speed. These cars are among the wonders of this rapid age.

Correspondence.

Iron Permanent Way.—Sir,—In your publication of the 1st inst. I recognise in Mr. Bridges Adams a fellow-labourer in the good cause of promoting the use of longitudinal iron permanent way, and I have no doubt that if his early system had enjoyed a fair trial, the principle would have reached a degree of completion possibly in advance of the system now in use in Germany, and certainly ought to have prevented the adoption of wooden sleepers in India and other tropical climates. I believe, however, that the plan of placing the horizontal angle-arm below is preferable, inasmuch as it permits more careful packing of ballast under and between the rails, and facilitates the removal of the head-rail, which in my systems six and seven (see *Journal*, p. 146) can be adjusted or renewed without disturbing the integrity of the under-way, which remains essentially permanent, as long as we do not incorporate perishable wood or destructive cast-iron. Mr. Adams is quite right in advancing that elasticity of wheels should have deserved more attention than in practice it has hitherto got in this country. His spring-lined tyres are admirably efficient on engine-wheels; on carriages and trucks we have supplied elasticity by means of the corrugated wrought-iron disc-wheel, which is in general use on German railways, and may probably work its way here when statistics of maintenance of rolling stock are made up and studied. But I agree with Mr. Adams that it requires perseverance (if worth one's while) to direct railway authorities, or advisers, in the way of economy.—I am, &c., T. A. Rochussen.

23, Abchurch-lane, February 5, 1867.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb. *Delivered on 11th August*, 1866.

Civil Service Commissioners—Eleventh Report.
Manufactures, Commerce, &c.—Reports by Her Majesty's Secretaries of Embassy and Legation, No. 16.

Session, 1865.

442. (C. I.) Poor Rates and Pauperism—Return (C.).

Delivered on 13th August, 1866.

355. (I.) Industrial and Provident Societies—Return.
432. South Kensington Museum (New Buildings)—Correspondence
467. Private Bills—Return.
468. Bankruptcy—Return.

Delivered on 15th August, 1866.

422. (A. I.) Poor Rates and Pauperism—Return (A.).
487. Education (Conscience Clause)—Correspondence, &c.
488. Income and Property Tax—Return.
492. Vessels and Tonnage, &c.—Return.
517. Paddington Workhouse—Return.
518. Rotherhithe Workhouse Infirmary—Return.
Meat Curing (South America)—Report on the methods employed in the River Plate.

Delivered on 16th August, 1866.

392. Education—Report and Evidence.

MEETINGS FOR THE ENSUING WEEK.

Mon.....R. Geographical, 8½. 1. Last Letter of M. Jules Gerard. 2. Mr. H. K. Hines, "Ascent of Mount Hood, Oregon." 3. Mr. R. Brown, "Journey across the Cascade Mountains, and through the Country of the Snake Indians."
London Inst., 7. Rev. C. M. Davies, "On Wit and Humour—Ancient, Mediæval, and Modern."
British Architects, 8.
Medical, 8.
R. United Service Inst., 8½. Mr. James Reddie, "Manning the Navy."

Tues ...Royal Inst., 3. Prof. Tyndall, "On Vibratory Motion, with special reference to Sound."
Civil Engineers, 8. Mr. Wm. Henry Barlow, "Description of the Clifton Suspension Bridge."
Ethnological, 8. Mr. J. Crawfurd, "On the Vegetable and Animal Food of the Natives of Australia, with the comparison between the Australians and some other Races of Man."
Photographic, 8. Annual Meeting.

Wed ...Society of Arts, 8. Mr. D. N. Defries, "On Artificial Illumination."
Graphic, 8.
Microscopical, 8. Annual Meeting.
Literary Fund, 3.
Archæological Assoc., 8½.

Thur ...London Inst., 7. Prof. Wanklyn, "On the Chemistry of the Noble Metals."
Royal, 8½.
Antiquaries, 8½.
Royal Inst., 3. Prof. Tyndall, "On Vibratory Motion, with special reference to Sound."
Zoological, 8½.
Syro-Egyptian, 7½. Mr. Sharp, "On the Races of Men in Ancient Egypt."
R. Society Club, 6.

Fri .....Royal Inst., 8. Mr. C. F. Varley, "On the Atlantic Telegraph."
Philological, 8.
Geological, 1. Annual Meeting.

Sat .....R. Inst., 3. Mr. G. A. Macfarren, "On Harmony."
R. Botanic, 3¾.

Patents.

From Commissioners of Patents' Journal, February 1st.

Grants of Provisional Protection.

Artificial legs—63—A. V. Newton.
Baths, portable—3015—C. W. Orford.
Bolts—118—W. Stafford and W. P. McCallum.
Breech-loading fire-arms and ordnance—10—J. Plews.
Candles—39—B. Biggs.
Carding material—2975—W. W. Marston.
Carriage axles, lubricating—96—G. Haseltine.
Carriage-lifting jacks—94—A. H. Brandon.
Cooking apparatus—3453—F. P. Warren.
Dry tinctorial compounds—106—A. J. Cooley.
Engines—43—F. B. Doering.
Fibrous materials, roving, &c.—37—C. Preston, G. Dania, W. Houghton, and R. Bottomley.
Fibrous substances, cleansing—3093—J. Mitchell and W. C. Laird.
Fire-arms, breech-loading—33—D Dowling and C. Greves.
Fire-arms, breech-loading—59—J. H. Burton.
Fire-arms, breech-loading—112—C. W. Lancaster.
Fire-arms, ordnance, and cartridges—114—G. Hookham.
Furnaces, preventing smoke from—19—J. K. Broadbent.
Gun-locks, self-acting safety—49—J. Stanton.
Harmoniums and organs—41—C. Kelly and C. Laurent.
Jacquard engines—116—W. Howarth, and M. and J. Pearson.
Jacquard tapestry—53—W. Wood.
Knitted fabrics, linking, &c—3305—W. Campion.
Lead, extracting silver from—3449—C. F. Flach.
Locks and keys—3441—H. Allman.
Manometrical sounding apparatus—2531—F. Tolhausen.
Needles—3399—W. Brookes and J. Mayes.
Newspapers, folding—110—W. A. Lyttle.
Oils, producing—2847—J. Harris.
Photographs, producing surfaces from—45—R. H. Ashton.
Pianofortes, upright—31—J. H. Schucht.
Printing presses, cylindrical—3331—G. Davies.
Projectiles, probing for—98—S. de Wilde.
Rails—3439—W. Loeder.
Receptacles—122—R. Newhall.
Safety match-boxes—124—H. Starr.
Saws—21—W. Lamoreux.
Shafts, regulating the speed of—51—R. Robinson.
Steam engines—61—J. Petrie.
Steam engines, steam jackets for—35—E. A. Cowper.
Vehicles—17—J. Cockshoot, jun.
Vehicles, registering the distance travelled by—2979—C. M. Bathias.
Watch-bow and pendant, revolving—3141—R. Mitchell, jun.
Water, heating—27—J. Lane.
Yarns, sizing—3385—F. Beltzer.

Inventions with Complete Specifications Filed.

Fire-proof safes—229—W. Snell.
Thread, dressing—224—H. A. Bonneville.

Patents Sealed.

1941. H. A. Bonneville.
1992. W. Furness and W. Bray.
1996. W. E. Newton.
2004. J. Whittaker.
2009. C. Ritchie.
2013. J. Boyd.
2017. I. Dimock.
2025. J. Hamilton.
2029. E. Lywood.
2079. R. Bagley.
3014. A. E. Blavier.

From Commissioners of Patents' Journal, February 5th.

Patents Sealed.

2032. G. Warriner and W. H. Stallard.
2033. W. R. Lake.
2035. C. A. McEvoy.
2043. P. Spence.
2058. L. E. Williams.
2060. M. A. Muir & J. McIlwham.
2064. J. E. Keirby.
2065. H. G. Craig.
2069. E. A. Cowper.
2074. E. Whalley.
2075. H. Sanderson.
2124. R. A. E. Scott.
2139. R. A. E. Scott.
2181. W. E. Newton.
2211. L. Delagarde.
2222. W. T. Eley.
2264. H. A. Bonneville.
2316. W. Clark.
2475. A. H. Thurgar.
2505. M. Ridley, W. Pawson, and C. Basker.
2666. W. R. Lake.
2718. G. Haseltine.
2740. G. Haseltine.
2876. E. H. Bentall.
2927. H. A. Bonneville.
3052. E. H. Knight.
3361. W. R. Lake.

Patents on which the Stamp Duty of £50 has been Paid.

289. A. J. Walker.
258. J. Phillips.
271. E. Harrison.
272. J. Clegg, J. Smith, and W. Carnelley.
278. P. W. Gengembre.
287. F. W. Webb.
299. J. Young.
301. E. Lucius.
321. H. A. Fletcher.
414. H. Y. D. Scott.
429. E. J. Leonard.
491. P. H. Muntz.

Patents on which the Stamp Duty of £100 has been Paid.

276. A. and E. M. Denny.
379. W. Mitton and J. Penney.
284. T. Blackburn & M. Knowles.

Registered Designs.

Measuring Filler—January 25—4836—James Mourant, Granville Jersey.
Sash Fastener—January 26—4837—Thomas Pemberton and Sons, Birmingham.
Double-action Alarm Bell—January 26—4838—Thomas Pemberton and Sons, Birmingham.
Non-disputant Money Till—January 31—4839—W. Boaler, 7, Talbot-terrace, Notting-hill; and George Boaler, 9, New York-street, Brighton.
Gum Pot—January 31—4840—S. Maw and Son, 11, Aldersgate-street.
The Notchet Fire Plate—February 5—4841—Langley Panks, 36, North-street, Hackney.

Journal of the Society of Arts.

FRIDAY, FEBRUARY 15, 1867.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'Clock:—

February 20.—"On the Water Supply of London as it affects the Interests of the Consumers." By Thomas Beggs, Esq.

February 27.—"On the Economy of Telegraphy as part of a Public System of Postal Communication." By Edwin Chadwick, Esq., C.B.

March 6.—The following subject for Discussion will be introduced by Mr. Christopher Cooke:—"On Storm Signals and Forecasts, their utility and public importance with respect to Navigation and Commerce."

Cantor Lectures.

A course of Six Lectures "On Pottery and Porcelain," illustrated by specimens of various manufactures, and by photographs and diagrams, is now being delivered by William Chaffers, Esq.

Lecture V.—Monday, February 18.

European Porcelain.—Italy, Germany, France, Holland, Belgium, Russia, Poland, &c.

Lecture VI.—Monday, February 25.

English Pottery and Porcelain.—Early History, continued to the beginning of the 19th century.

The lectures commence each evening at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend to each lecture. Tickets for this purpose have been issued to each member.

Art-Workmanship Competition.

The Department of Science and Art has purchased, for the South Kensington Museum, the following articles, for which prizes had been awarded in the recent Art-workmanship competition:—

5. Flowers carved in Caen Stone, by W. H. Holmes, 101, Dean-street, Soho, W. Price £5.—(*Prize* of £5.)

15. Repoussé Work in Metal.—Executed in iron, after the Martelli bronze mirror case at South Kensington, by G. Page, 39, Duglas-street, Northampton-road, Clerkenwell, E.C. Price £20.—(1st *Prize* of £10; also, North London Exhibition *Prize*.*)

28. Hammered Work in Iron.—By George Hobbs, 4, Marlboro'-mews, Blenheim-street, W. Price £5 10s. (*Prize* of £2.)

30*a*. Ditto, Panel for a screen, by W. Letheren, Lansdown Iron Works, Cheltenham. Price £20.—(*Prize* of £10.)

31. "Autumn," Female Head in satin wood, by G. F. Bridge, 3, Vincent-square, S.W. Price £5 10s.—(*Prize* of £5.)

* This Prize consists of the interest of £167 7s. 3d. Consols, invested in the name of the Society of Arts, to be awarded by the Council "for the best specimen of skilled workmanship" at the Society's Exhibition.

The works sent in competition for these Prizes are now placed in the Society's Great Room for the inspection of members and their friends.

Examinations, 1867.

In addition to the prizes announced in the Programme of Examinations, the following are offered:—

The Worshipful Company of Coach and Coach Harness Makers offer a prize of £3 in Freehand Drawing, and a prize of £2 in Practical Mechanics, to the candidates who, being employed in the coachmaking trade, obtain the highest number of marks, with a certificate, in those subjects respectively.

The Worshipful Company of Goldsmiths offer three prizes—of £5, £3, and £2 respectively—to the three candidates who, being employed on works in the precious metals in any part of the United Kingdom, shall obtain from the examiners the first, second, and next highest number of marks, such prizes to be distinguished as the "Goldsmiths' Company's Prizes."

Institutions.

The following Institutions have been received into Union since the last announcement:—

Alderley Edge Educational Institute.
Galgate (Lancaster) Mechanics' Institution.

Memorials of Eminent Men.

The Society's Committee for marking by memorial tablets the spots which are interesting as connected with eminent men or historical events, have made a commencement of this work. A tablet, marking the house were Byron was born, has been attached to No. 24, Holles-street, Cavendish-square, by permission of the occupiers, Messrs. Boosey and Co.

Subscriptions.

The Christmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Food Committee.

A meeting of this committee took place on Saturday, the 9th instant, at eleven o'clock; the Right Hon. Henry Austin Bruce, M.P., in the chair. There were also present—Professor Robert Bentley; Messrs. W. H. Bodkin, Assistant-Judge; Harry Chester; Hugh C. E. Childers, M.P.; Rev. W. L. Clay; Lord De Lisle and Dudley; Messrs. William Hawes, C. Wren Hoskyns, Francis S. Powell, M.P.; Clare

Sewell Read, M.P.; G. Sclater-Booth, M.P.; Benjamin Shaw, Thomas Twining, James T. Ware, and Edward Wilson.

The Secretary having read the minutes of the last meeting,

The Chairman said that the able and comprehensive address which was made to them at their last meeting, by Mr. Chester, would enable him to dispense with the necessity of addressing them again upon the subjects then dealt with. He thought he might assume that they were familiar with the objects for which the committee had been formed. He would therefore address himself at once to the practical points—how and by what means they could best organise themselves so as to attain most rapidly and effectively the objects for which they were constituted? These objects, broadly stated, were the supply of additional food to the people, and the better use of those supplies which they already possessed. The former subject embraced the supply of meat and of cereals from abroad, but more especially of meat—and when he said meat, he did not mean live cattle, because he thought they might very well trust to the interests now occupied with that trade. It was one which had increased rapidly—one which recent circumstances had tended greatly to augment; and as communications on the Continent by railway increased, and greater facilities for transit were afforded, there could be no question that, to some considerable extent, there would be an increase in the supply of cattle. But there was another question, which could not be left entirely to the management of traders, and that was those operations into which science so largely entered—namely, the supply of preserved meat, and of the essence of meat—a question which had already occupied the public attention, but as to which, he thought, no very great progress had hitherto been made. Now, it seemed to him, that they might most usefully form a sub-committee, specially to address itself to that subject—the supply of preserved meat and of the essence of meat from foreign countries. It might be, perhaps, as well to entrust the same sub-committee with the question, also, of considering what supply of cereals and other edibles could be got as well as meat; but in the first instance he would rather suggest that that sub-committee be requested to apply itself particularly to the branch of the subject he had just indicated. Then came the question as regarded home supplies. In his opinion, by far the most important parts of this question were those specially indicated by Mr. Chester, the supply of milk and fish, and the spread of juster ideas of cookery than now prevailed among our working classes. As to the supply of milk, it was notorious that it was inadequate, not only in the metropolis, but everywhere, even in the most strictly rural districts. The importance of that supply to the health of our population could not be exaggerated, and therefore he thought that by itself might occupy the attention of another sub-committee. Another question, of much inferior importance, but one of deeply national and growing interest, was the supply of fish. Recent disclosures had shown that here was a field open to considerable improvement; and he did not doubt that if the attention of a few intelligent, determined men were applied to that subject, there might be a very great advance made in that respect. Perhaps the largest and most difficult question of all to deal with was that of what might be called national dietetics—the actual food used by the people, and their mode of cooking it. There were few of them who had not had opportunities of inquiring into this matter. He might say, in passing, with respect to certain classes of the population, that he (the Chairman) had some oppo.tunities of studying this subject during the two years he served upon the Mining Commission, when that was made a part of the inquiry. The ignorance which prevailed as to the proper use of food among the working classes of this country was very great. Probably in this matter they were among the most backward in Europe, certainly they were the most wasteful; and, great as the evil was, it seemed to him that greater still was the difficulty of dealing with it, because we had to do with the settled habits, and often with the fixed prejudices of the people. But the difficulty of a question was no reason why they should not attempt to grapple with it, and he hoped they would be determined to exert themselves by every means to extend knowledge in this direction, and to remove that ignorance which all allowed to be a great evil. He had already indicated sufficient employment for four sub-committees, and he did not think that at present it would be well to appoint a larger number. There was another point, however, which he thought well worthy the attention of this Committee, and that was what steps should be taken with respect to the remedying of a crying evil, namely, the frauds that were committed, both as to the weight and quality of the goods sold, especially against the poor. It seemed to him that that was a subject ripe for legislation. The Committee had already communicated with the Home Office to ask for certain returns which would throw light on this subject—returns as to the number of prosecutions that had been instituted under the law, which, with respect to false weights, was certainly inadequate. The offence was, perhaps, sufficiently clearly defined, but the punishment was altogether insufficient, and he saw no reason why the present Session should pass without a Bill being introduced into Parliament for remedying that evil. It might, therefore, be advantageous to combine a few legal gentlemen and members of Parliament into a sub-committee, for the special purpose of considering that subject. These matters were far from exhausting the whole question, which indeed was almost boundless, but he thought that they should limit themselves, in the first instance at least, to the most important branches of the inquiry, particularly those indicated by Mr. Chester in his opening address. What they had to do that morning was to divide the Committee into sub-committees, choosing the members with reference to their special fitness for investigating the different subjects of inquiry. He would, therefore, propose at once to the consideration of the Committee that they should take their first step by determining what the number of sub-committees should be, and then by dividing themselves into those sub-committees. A very comprehensive circular had been prepared, which it was proposed to send to any person supposed to possess special knowledge on any of these questions. If any suggestion could be made for its improvement, he should be very happy to hear it.

Mr. C. S. Read, M.P., said that, with respect to the transit of dead meat, very much good might be done by a simple inquiry into the matter. It was generally supposed that the offal of meat killed in the country could not be sent up to town. The idea might arise, perhaps, from the prejudice or the interests of certain people in the trade. If attention were directed to this matter by the Committee some valuable information might be obtained.

Mr. Chandos Wren Hoskyns said, with reference to the supply of milk, it was mentioned in the address of the President of the Royal Agricultural Society, at the beginning of the year, that the quantity of milk sent up to the metropolis from different parts of the country amounted to something like seven million gallons annually. It was also stated that this milk came from distances varying from between seven miles and two hundred miles,—that there were parts of the country, two hundred miles off, where the occupiers found it their interest to send up milk to the metropolis, but there were other parts, less than fifty miles distant, where attention had never been called to this supply, and by the mere publication of this fact some good might be done.

The Chairman said he quite agreed with Mr. Read,

that all the information that reached them last year in Parliament showed that one of the objections to killing at a distance was that a great deal of the offal of the meat, which would be bought by the poorest of the people, did not reach the metropolis, and did not find a market in the place where the cattle were slaughtered. That seemed to be a subject that might very well be considered. Another matter for consideration was whether a larger area might not be obtained from which to draw a supply of milk for the metropolis. It must be remembered, however, that they were not dealing with the interests of the metropolis alone, but with the supplies of the whole of the population. The Council should first get accurate information, and then propagate it, so as to make the farmers understand that they were not only backward in the question of the supply of education to their workmen, but also in the supply of that which was so necessary to the health of their children—milk.

Mr. Edward Wilson said, looking over the programme, which had been very carefully drawn up by the sub-committee, he began to feel rather appalled at the wideness of the scope of the inquiry. Probably the best mode of dealing with the matter would be through the agency of sub-committees; but viewing the committee as it at present existed, it seemed to him that if they did not materially increase the number of members they would not be able to appoint many sub-committees. With regard to another question—the establishment of cheap dining-rooms—the success of Mr. Corbet at Glasgow was well known, and was an illustration of what could be done by singleness of purpose and energy. He (Mr. Wilson) would be very glad to join any set of gentlemen, to whom the question of profit was not an object, to see if something practical could not be done in London in this direction.

Mr. Sclater-Booth, M.P., said that, with regard to the subject of fraudulent weights and measures, he believed that in the course of a few weeks a bill would be prepared and introduced, strengthening the law in respect to adulterations and frauds. A small sub-committee on this subject might, therefore, be useful. With regard to the milk question, he might say that the subject of the disposal of the sewage was very appropriate to that investigation, and should not be lost sight of in considering it.

Professor Bentley thought that four sub-committees would be too many. He would propose that the first three subjects, which were the most important, should be grouped together under one sub-committee, who would thus deal with the animal kingdom. The fourth and fifth would occupy a second sub-committee, who would deal with the vegetable kingdom, and also with the subject of beverages. Then the sixth and seventh subjects—dietaries, &c.—would naturally come under a third sub-committee. As to the last subject—adulteration—he thought it would be utterly impossible to do anything with a bill on that question this session; and his impression was that it would come far better at the end of the inquiry, when a vast amount of valuable information had been collected by the sub-committees.

The Chairman thought the subject of meat should be separated from those of milk and fish. He agreed that the question of adulteration was a very large one, and would require a great amount of preparation, but the subject of fraud was very pressing, and influenced enormously the daily comforts of the people, and he thought this might be dealt with very rapidly.

Mr. Chester thought the subject of adulteration a most important one, and hoped the Committee would be able to do something to stay the increasing tide of fraud in the commercial transactions connected with the supply of food. He thought when they had collected a sufficient amount of information to enable them to proceed, as to the police regulations of foreign countries as well as our own, they might, perhaps, have a paper read by a gentleman now present, and thus they might have some very advantageous denunciations of the evils which existed put forth from this Society. There might be also a bill brought into Parliament. There were several members of the House of Commons present, who, he had no doubt, would take an active part in the matter. It would not be a party question, and thus, he thought, if properly prepared, it would pass without difficulty.

Mr. Shaw thought the number of sub-committees should not be too large, or there would be a difficulty in working them. He was rather for not pressing the matter with regard to adulteration at first. If they could get working committees on meat, and on milk and fish, he thought they would really do a great deal. As regarded the improvement of cookery, that seemed to him a subsequent question; it would be better to have the facts brought out by the other committees first as to the supply of food. With reference to the question of the supply of meat, they must recollect that they had now in this country, for a short time, Mr. Parish, the Consul at Buenos Ayres, and if they could get matters forward while he was here, they would be able to tell him fully what they required, and then he would go back to his consulship, and do much good in promoting the supply.

Mr. F. S. Powell, M.P., suggested that as to the question of fish, some of the members of the Commission lately sitting in Paris might be able to give them some very valuable information. He had received a letter from the Professor of Chemistry at Cambridge, which touched upon a question it might be worth while for the Committee to look into—namely, the quantity of fish which was rejected by fishermen as not being valuable.

Mr. Shaw moved—"That one sub-committee be appointed to inquire into the question of meat, and another to inquire into those of milk and fish." This, after some discussion, was carried, the sub-committees being constituted as follows:—

Meat.—Right Hon. H. Austin Bruce, M.P., Messrs. H. Chester, H. C. E. Childers, M.P., C. Wren Hoskyns, W. H. Michael, F. Parish, C. Sewell Read, M.P., Benjamin Shaw, T. Twining, James T. Ware, and E. Wilson.

Milk and Fish.—Lord De L'Isle and Dudley, Lord Robert Montagu, M.P., Right Hon. H. Austin Bruce, M.P., Messrs. H. Chester, and C. Sewell Read, M.P.; in addition to whom Messrs. James Caird, P. McLagan, M.P., H. S. Thompson, and J. C. Morton were to be asked to join.

The Sub-Committee on Meat met at 10.30 on Wednesday. Present—The Right Hon. H. A. Bruce, M.P., in the chair; Messrs. C. S. Read, M.P., E. Wilson, F. Parish, B. Shaw, H. Chester, and J. T. Ware. The Committee, after discussing the course which their proceedings should take, directed the Secretary to bring before them at their next meeting specimens of the various methods of meat preservation.

Cantor Lectures.

"On Pottery and Porcelain." By W. Chaffers, Esq.

Lecture IV.—Monday, Feb. 12.

German Pottery and Oriental Porcelain.

The lecture commenced with a description of the two sorts of earthenware made in Germany—fayence and grès, or stoneware, and their properties were defined. In speaking of Nuremberg, the lecturer said the most celebrated potter was Veit Hirschvogel, of Schelestadt, born in 1441, and died in 1552 (contemporary with Luca della Robbia, of Florence), who settled here about 1470. These early specimens are somewhat like the maiolica of Italy, but the colours are brighter—the

green predominating in most of the specimens; figures in relief in niches are frequently seen on vases; and many tiles of the sixteenth century, which formed portions of stoves and chimney-pieces, are still in existence, and were referred to. The stoneware of Germany is well known throughout Europe; its durability for domestic purposes, and the elegant character of its ornamentation in relief, caused it to be sought for everywhere. The grès de Cologne was especially esteemed, and is often confounded with the grès de Flanders, which latter name is given indiscriminately to all the stoneware of Germany, notwithstanding the German inscriptions upon the vessels, and the arms of German cities moulded upon them; an erroneous nomenclature which ought to be rectified. The finest specimens are clearly traceable to Germany—probably to Cologne. The ware was made in moulds, and usually dated from 1550 to about 1687. Buntzlau, Harburgh, and Grenzhausen, were also noticed, and Creussen, in Bavaria, where the earthenware jugs (with the apostles ranged round them in relief) were made. Teylingen, in Holland, is celebrated in ceramic history from its association with the unfortunate Jacqueline, Countess of Hainault, and the manufacture of an earthenware cruche, called, after her, "Jacoba Kaunebje." This princess was wife of John Duke of Brabant, and after many severe trials she retired, 1433, to the Chateau of Teylingen. While here (according to the tradition) she employed her leisure in superintending the manufacture of cruches, which were thrown into the moat of the chateau, that in after ages they might be considered works of antiquity. This ware is of common quality, without any ornamentation. The *Jacoba Kaunebje* figured by Marryat, in his history of pottery, is actually a superb Cologne ware canette, with designs in relief, and nearly two centuries later in date. The next manufactory of importance was Delft, celebrated at an early period for its enamelled fayence. It was probably about the time of the introduction of Chinese porcelain into Europe that the Delft potteries sprang into active existence, and no examples are known of an earlier date than 1530. The importance of the manufacture went on increasing throughout the 16th century, but the commencement of the 17th century witnessed its greatest development. At that time there were nearly fifty fabriques in full work at Delft. In the middle of the 18th century they were reduced to twenty-four, yet making a considerable quantity of pottery. At the present day, of all this number only one remains, and its productions are of a very inferior character. Mr. Chaffers described the varied forms of Delft ware, and, among other curious efforts of the potters, some violins and other musical instruments. In introducing the subject of Chinese porcelain, the early and extravagant myths were briefly adverted to, being mixed up with historical facts. The Chinese historians attribute the first discovery of the secrets of the ceramic art to the reign of Hoang-ti, 2,698 years before our era. This pottery was a sort of hard stone ware. The true porcelain was not invented until about 185 B.C., sixteen hundred years before it was known to the western nations of the globe. The word *pourcelaine* has existed in the French language since the 14th century, long before the introduction of China ware into Europe, and it was then applied to mother-of-pearl, and not to porcelain in our present acceptation of the term, but, from a certain similarity, it became in the 16th century generally so called. The Chinese kept the composition of porcelain a profound secret, and endeavoured to deceive travellers by all manner of wonderful tales; one of these strange conjectures being, that it was nothing more than a mass composed of plaster, eggs, shells of marine locusts, and other similar compounds, which, being well mixed together, was hidden secretly under ground, where it remained 80 years, and was left as a valuable heir-loom by the Chinese to their descendants as being of greater value than gold. There are numerous manufactories of porcelain in China, and the lecturer described the most important of them, the fabrique of King-te-tchin, established in the sixth century, and taken under imperial patronage in A.D. 1004. The city contains more than a million of souls. The expense of procuring materials must have been considerable, for the wood for the furnaces had to be taken a hundred leagues, and provisions were dear, yet all could here find employment. The young and old, the lame, and the blind could earn a livelihood by grinding colours, or in other ways. In 1700 there were nearly 3,000 furnaces constantly burning, which presented at night the appearance of a town on fire. After a very interesting account of King-te-tchin, the lecturer concluded by stating that it was now a heap of ruins. In the course of the recent disturbances which have convulsed the country, the Taepings sacked and pillaged the imperial manufactory, destroying all the kilns and workshops, giving a fatal and irrecoverable blow to this particular industry in China. The porcelain tower of Nankin was built in 1403-1424, by the Emperor Yong-lo, on the site of an earlier structure of other materials. It is not, therefore, so ancient as generally supposed. The tower was octagonal, and consisted of nine stages, elevated on a pedestal of the same form—261 feet high. It was built of brick, encased with tiles of porcelain, the quality of the ware being equal to that of which the ordinary vessels are composed. Each stage had a projecting cornice, and at every angle a bell, eighty in all; when agitated by the wind they produced a sound which, at a short distance, might have been taken for an Eolian harp. The Emperor Khang-hi visited it in 1664, and caused it to be repaired. This structure has recently been completely demolished by the Taepings, and not a fragment is left to mark the site of this once celebrated monument. The various monsters which are found upon the ware and the deities were explained. The dragon, emblematical of imperial dignity, is provided with five claws. Princes of lower rank bear the same dragon with four claws; others only three; while the mandarins are only allowed a serpent with four claws, called *mang*. The Khylin and the Dog of Fo were exemplified by specimens, and other symbolical animals referred to. The porcelain of China is composed of two earths, the one a decomposed feltspathic rock, called *kaolin*, and the other a rock of the same geological origin, mixed with quartz, called *petuntse*. There being a perfect identity between these elements, they both harmonize so completely that they have an equally resisting power when placed in the kiln. The *kaolin* used in making this porcelain is much softer than *petuntse* when dug out of the quarry, but it is this which, by its mixture with the other, gives strength and firmness to the work. It is by a modification of the glaze, so as to render it more or less expansive when submitted to the heat of the kiln, that the well-known variety called *crackle* is produced. The porcelain made and decorated at King-te-tchin is not known of an earlier period than the commencement of the fourteenth century. The vases of the Hong-wou period, 1368-1398, and those of Yong-lo, 1403-1424, are generally rude in design and of imperfect fabrication. Under Siouen-te, 1426-1436, a vast improvement is perceptible. These are frequently met with. The best period, however, of Chinese art is the *Tching-hoa*, which continued from 1436 to 1487. The most ancient mode of decoration was the blue camaieu, and it is still much esteemed in China. On this blue ware Chinese characters are frequently found denoting the period in which they were made. Few of the ancient pieces painted in colours are marked, and it is therefore difficult to tell even their approximate date, especially as there was a conventional mode of decoration which had been practised from time immemorial; the painters worked according to given models or patterns, and the same uncouth and rude designs were placed, through successive ages, upon the ware.

Mr. Chaffers, by the aid of diagrams and examples, clearly explained the means by which the dates or periods could be deciphered with certainty. They usually consist of six marks, the two first express the dynasty, the two next the period, and the two last signify "made during," like our expression *fecit*. Characters, in a square seal form, were used from the commencement of the 18th century, either stamped or stencilled in red. Mr. Chaffers explained the manner of deciphering these characters, so as to tell the exact date; they are the same meaning as the others, but made angular instead of curvilinear, to suit the squareness of the seal. In speaking of the curiosities of porcelain, he exhibited some cups, with an outer reticulated covering, completely insulated from the inner vessel, except at the rims at top and bottom, where it is joined. These were used for tea or hot liquids, and can be held in the hand with impunity, notwithstanding the heat enclosed. Another variety consists in cutting or punching out pieces of the paste or body of the ware in patterns before it is baked; it is afterwards dipped in glaze, which fills up the holes. The pattern, being much more transparent than the body of the ware, is distinctly seen when held to the light. Others were made with movable bands, in such a manner that although separate they cannot be altogether removed from the piece. The wonder is that in the baking, the edges in juxtaposition should not have become cemented together. Other curiosities were shown, as the "Cup of Tantalus," puzzle-jugs and teapots, swimming tortoises, &c. The porcelain of Japan was fully described. Its discovery took place about 27 B.C., but it was not until 1211-1221 that it was fully developed. The porcelain is very much like that of China, but the colours are more brilliant on the fine pieces, of a better finish, and the designs more of the European character, the flowers being more natural and the monsters less hideous; the paste is of better quality, and the glaze a purer white, especially in the 17th and 18th centuries. The beautiful egg-shell porcelain was spoken of, and specimens of ancient and modern manufacture were shown—some covered with bamboo threads woven together with wonderful precision. The Japanese excel in a particular fabrication which is almost peculiar to them—the lac, usually called Lac Japan. It is a resinous gum, which exudes from certain trees, especially the *Rhus vernix*. This varnish is applied by them to a great variety of materials, and is sometimes inlaid with mother-of-pearl in landscapes and flowers, birds, &c. The usual colours are red, brown, and black, of different shades, and gold is used upon it with effect. Lac was frequently applied to porcelain vases, either entirely covering the surface or only partially in relief.

Some specimens of the Satsuma porcelain were exhibited, brought to this country by the English officers engaged in its bombardment some years since. Also some china made in India, painted with Hindu deities. The table was filled with a choice collection of specimens of German stoneware and Oriental porcelain, kindly lent to the lecturer, to illustrate his remarks, by Mr. H. G. Bohn, Dr. Diamond, Mr. Durrant, and Mr. Wareham.

Tenth Ordinary Meeting.

Wednesday, February 13th, 1867; William Hawes, Esq., Vice-President of the Society, in the chair.

The following candidates were proposed for election as members of the Society:—

Brand, Henderson William, 5A, Courland-grove, S.
Chaffin, Matthew Henry, 18, Hart-street, Bloomsbury, W.C.
Fowler, John R., 1, Mitre-court-buildings, Temple, E.C.
Green, John, 7, Sherborne-street, N.
Harrington, G. H., 5, Billiter-square, E.C.
Harrison, Frederic, 7, New-square, Lincoln's-inn, W.C.
Hayes, Robert, 1, Pembridge-square, Bayswater, W.
Hoff, Edward, Carpet Manufactory, Louth.
Hopkinson, John, York-place, Oxford-street, Manchester.
Isaac, S., 2, Hyde-park-gate, W.
King, Elmund, 1, Elvaston-place, Queen's-gate, W.
Layton, James, The Wilderness, Baldock.
Lee, Richard, 39, Lothbury, E.C.
Loughborough, Thomas, 23, Austin-friars, E.C., and Selwood-lodge, Tulse-hill, S.
Macintosh, William, 24, Paternoster-row, E.C.
Phillips, Henry Louis, 32, New Broad-street, E.C.

The following candidates were balloted for, and duly elected members of the Society:—

Atkins, Francis Henry, 62, Fleet-street, E.C.
Barlow, James, Greenthorn, near Bolton.
Burgess, A. W., 107, Strand, W.C.
Chaffer, Thomas, 14, Great Howard-street, Liverpool.
Greenwood, Thomas, 28, Waterloo-road, Cheetham, Manchester.
Hayes, Henry, 31, College-green, Dublin.
Richardson, William, Hartford Works, Oldham.
Whitehead, Peter Ormerod, Rawtenstall.

The Paper read was—

ON ARTIFICIAL ILLUMINATION.

By D. N. Defries, Esq.

The advantages and importance of artificial illumination are too obvious to need any remarks from me; nor need I dwell on its history from the period of early civilisation down to the present time; how a splinter of fir or kernel of a nut might have been resorted to for the purpose. Accident, probably, soon taught mankind that the resinous exudations of trees, the fat of animals, and the bitumen and naphtha of the mineral kingdom might be made available; and we are all familiar with the torch, the candle, and the infinite variety of lamps for the burning of fat or oil.

It is very probable that the earliest lamps were made of no set form, but that the fat or oil was placed in any convenient vessel and burnt by means of a bundle of rushes, dried moss or decayed vegetables.

As civilization advanced attention would naturally be directed to the form best suited for the object sought. The lamp—at first but little more than a circular vessel containing a combustible material—was gradually developed into the artistic forms of the ancient Greeks, and in our own times has received the improved appliances which science has enabled the moderns to adapt to it. At a very early period it must have been observed that when an attempt was made to enlarge the wick beyond a certain point the flame became dull and smoky. To remedy this it was customary to split the wick, so as to divide it into a number of smaller flames, each of which would allow the atmosphere freely to circulate round it so as to keep up tolerably good combustion. In 1780, Argand made the first great step in advance, and, by means of cylindrical wicks, supplied air for combustion to the inside as well as the outside of the flame. All the subsequent improvements of this invention have been made with a view of adjusting the wick, and directing the current of atmospheric air into the body of the flame. The first was accomplished by means of a rack and pinion, the second by various forms of fountains and syphons; and in the Carcel or moderator lamp by means of a piston and pressure from a spring. Count Rumford invented the reservoir, and Parker placed the oil above the level of the flame. For the combustion of volatile oils and naphtha, lamps of very different construction are required, and great care had to be taken to secure a due and regulated supply of air to the flame, and contrivances for preventing the heat from volatilising these liquids became necessary. These are the invention of

several well-known men, amongst whom the names of Beale, Holliday, Luderstoff, Keir, and Young may be mentioned.

The "Bude" light of Mr. Gurney is only an extension of the principle of the Argand lamp, in which, in the place of atmospheric air, a jet of pure oxygen is passed into the centre of the flame, and by this means the combustion and light are greatly increased; but, in consequence of the complicated nature of the apparatus and the careful attention necessary in its management, it has never come into general use.

Before leaving the subject of lamps, I may be permitted to observe that the "Paraffine" lamp, when properly constructed and used with the best kind of paraffine oil or petroleum, is an excellent and economical means of illumination, and, with careful attention, is perfectly safe; but, on the other hand, if bad oil is used and the lamp overheated, explosions may occur.

It would take too much time for me to speak of all the materials used in the manufacture of candles, and the manipulation is so well known that I need not describe it. We are all familiar with the history of coal gas, so largely used now both in private houses and for the illumination of public buildings and our streets. The mode of manufacture and its purification have been so often described and are to be found in so many printed treatises, that I should not be justified in entering upon them now.

To relate to you the progress of gas—Murdoch's first application of it to lighting purposes, down to the efforts of Winsor, and the formation of the "Chartered Gas Company," and subsequently down to the present time—would be repeating an oft-told tale. The number of gas companies now in existence will, I think, be sufficient to show that the prejudice which at first existed against gas light is now overcome. But, notwithstanding that the subject is generally familiar, and although gas is so largely used, yet the public are but little acquainted with the methods adopted for burning it, and what burners are specially adapted for the various purposes for which the light is intended. The burning of gas has gone through nearly as many phases as the burning of the various other materials to which I have alluded, from the rude and simple pipe or orifice, whence the gas issues with combustion as imperfect as that of the original torch—and bearing indeed a great resemblance to it—down to the carefully-adjusted jets and their uniform variety of one supply of air. The flaring lights of our butchers' shops, with their enormous consumption of gas, are the types of the one; the fish-tail, the argand, and the sun-light, which after all is but a variety of the fish-tail, are types of the other.

Scarcely anything connected with the subject of gas illumination has commanded more attention than the means whereby gas may be burnt to the best advantage; and although the greatest ingenuity has been displayed, yet none of the arrangements possess that universal applicability for which they have been, in most cases, so highly vaunted. The reason of this is obvious; different kinds of gas require different forms of burner in order to effect perfect combustion. As a rule it may be stated, that the rich cannel gases are best consumed from burners with fine apertures, while the poorer gases are burnt with most advantage from larger apertures. Again, in the former case, provision should be made for a large supply of atmospheric air, as by spreading out the flame by means of an internal button, or by using tall glasses, whereas, in the latter case, the opposite condition should be observed. It is manifest, therefore, that no single burner can be constructed so as to secure both these requirements, and consequently that any burner which is well suited for one kind of gas is altogether unfit for the other. The most prominent gas burners in general use are as follows:—The simple jet, which is produced from a burner pierced with a single hole. This mode of consuming gas is not considered to be cleanly or economical, and, except for certain purposes of illumination, where we wish to produce some kind of device, is rarely employed. The "cockspur" burner is a burner with three or more jets radiating off from it, and burning separately. The light from such a burner is only equal to the sum of the individual jets, for, as they do not coalesce, they cannot in any way assist each other. It is one of the worst burners that can be employed. The "fish-tail" burner is the result of two small jets of flame impinging upon each other under a certain pressure. Probably, though so common in its use, it is but little known how the pure flat leaf of flame is produced in the fish-tail burner. The jet, instead of one perforation, has two, which meet at their exit, and the streams of gas as they issue impinge on each other, and thus spread out into that flat flame which is so familiar to us all. The "bat's wing" burner is so named on account of the shape of the flame. It is one of the oldest forms of gas burners; it is constructed with a fine slit, instead of two holes, for the exit of gas, and the flame is broader and not so high as the fish-tail. These burners are easily managed, and on this account are generally supplied to the public lamps.

The "sun burner" is a cluster of "fish-tail" burners placed round a common axis, and spreading out in a horizontal direction, so as to produce the figure of a flower, or of the sun. This burner is so constructed that the products of combustion are carried out of the room by means of a ventilating funnel and tube placed directly over it. In most cases the sun burner consists of seven clusters of nine fish-tails each. The burners are supplied with gas from a descending pipe, which branches to each cluster, and surrounding the whole is a sheet-iron cone, with a tube attached to the top, for carrying off the products of combustion. In this tube there is placed a butterfly-valve, for the purpose of regulating the current of air, so that the draughts may not be too great, and the lights may burn in a horizontal direction. Around the cone are placed other iron cases, which not only serve for ventilation, but also insulate the inner cone, and, by their cooling effect, prevent the intense heat of the latter from being communicated to the woodwork of the ceiling. These cylinders are not connected with each other or the cone, and therefore distinct currents of air pass between each of them; such is the cooling effect of these currents, that while the cone is hot, the two outside cases are of the same temperature as the atmosphere of the room. On the upper part of the cylinders there is an inverted cone, with a pipe passing trough the ceiling and roof, protected on the outside by a wind-guard, which allows the hot air and products of combustion to escape.

The "Argand" burner produces a flame which is exactly like that of an ordinary Argand oil lamp. The burner consists of a circular disc of iron, pierced with a number of holes. It is hollow in the middle, for the purpose of allowing a supply of air to the interior of the flame; and the jets of gas coalesce, so as to form a hollow cylindrical flame. A glass chimney is placed round the burner, in order that the supply of atmospheric air may be copious and steady. The number of holes, or jets, varies from ten to thirty for ordinary gas, and from thirty to ninety for cannel. In the former case the holes are comparatively large, and in the latter they are very small, as in the case of the fish-tail burner. Several patents have been taken out during the last few years for improvements in this form of burner; they have chiefly been directed to the lessening of the shadow which is cast by the ring and body of the apparatus. Leslie's Argand is constructed to allow a current of air to pass up between each of the jets, and so destroy, to a certain extent, the continuity of the flame. This is effected by a number of small tubes, which rise to an inch or so above the ring which supports them. These tubes are made to converge a little as they advance upwards, thus forming a truncated cone. The glasses are constructed so as to deflect the air into the flame; and

they are of different heights in order that they may be suited to different amounts of consumption.

I will now draw your attention to some of the processes for carburetting, as it is termed, that is, supplying to the gas before it is burnt the vapour of some volatile hydro-carbon, so as to increase its illuminating power.

Many inventions have been proposed for increasing the brilliancy of coal gas, and at the same time for rendering it more economical and innocuous. One was to pass the gas through an apparatus where a large surface of a liquid rich in carbon was exposed. This acted very well for a short time, the gas taking up large quantities of the hydro-carbon vapour; but the more volatile portion of this being consumed first, and only the heavier and less volatile liquid being left behind, it necessarily yielded less and less vapour, and the gas became poorer until it ceased to be in any degree improved. Besides this, the tarry and watery vapours were condensed in the interior of the apparatus, and rendered it after some time useless. Many forms of carburettors have been devised for getting rid of these difficulties, with more or less success. I refer to those invented by Woodward, Carless and Blagden, Saul and Armstrong, the Photogenic Gas Company, and others. The latest which I have seen is one invented and patented by Mr. Welch, wherein the reservoir is placed at the upper part, from which, by a simple arrangement, the liquid descends only as required to maintain the proper supply of vapour. This is brought about by the pressure of the gas itself, all floats being dispensed with. To prevent the apparatus from being obstructed by tarry and watery vapours, a chamber is placed at the bottom in which these are condensed, and they can be drawn off through a plug placed there for that purpose. The "carburettor" requires no attention beyond refilling periodically, the diminution of the intensity of the light showing when that operation is necessary.

There are certain illuminating agents which do not vitiate the air of the room; only two of these I shall mention this evening. The oxy-hydrogen, or "Drummond light," and the "electric light." The oxy-hydrogen light was first introduced to public notice by Lieutenant Drummond. It consists, as is well known, of a jet of oxygen and hydrogen gases which is projected under great pressure upon a cylinder of lime. The high temperature which is thus produced renders the earthy body so incandescent as to be intensely luminous. Another mode of obtaining this light is to throw a jet of oxygen into a flame of spirits of wine or ether, or mix the oxygen with coal gas instead of pure hydrogen. The electric light is produced as follows:—The electricity is conveyed from the battery by wires which should be of large size, so as to conduct it with ease, and should be covered with gutta-percha, so as to insulate them. Light may be obtained from the battery in two ways, either by bringing the poles into contact with a yard or so of platinum or iridium wire, wound into the form of a spiral, or by terminating them with cylinders of charcoal and then bringing these into contact. In each case the light is produced by the ignition of the conducting medium. Platinum or iridium is not so well suited for the purpose as charcoal, because, in the first place, the light is never so vivid, and, in the second place, the metal is very likely to fuse, and put a stop to the experiment. When charcoal is employed, it is found that the greatest intensity of light is produced by drawing the points apart from a quarter to half an inch, and then there is a stream of finely-powdered charcoal in a most intensely ignited state, forming an arc of flame. If the charcoal points are too close together we do not obtain the maximum effect, and if they are too far apart the arc is broken and the light extinguished. This it is which constitutes the difficulty in keeping up the electric light, and which gives the flame its unsteady and flickering character.

There have been several electric lamps invented, but the most perfect are those of MM. Duboscq and Serrin, of Paris.

Mr. Holmes has, within the last few years, made a considerable improvement in obtaining electricity, by constructing a large magnetic machine, which is driven by steam power, a description of which he gave in this room a few years ago.

The last magneto-electric light is that of Mr. Wylde. It is sufficiently brilliant for photography, but the apparatus is so ponderous that it requires steam power to work it.

Before quitting this subject I must not forget to mention the light caused by the ignition of the metal magnesium; but the great difficulty in getting this light to burn steadily, and also the expense of the metal, tend greatly to preclude its introduction into general use.

The last invention with regard to artificial illumination is the Augasma light, produced by causing atmospheric air to take up a large quantity of a very volatile hydro-carbon by means of a carburettor especially constructed for the purpose. This has been often attempted but without any practical success till now, owing to the defective arrangement of the apparatus. In Mr. E. Welch's machine the air is pumped by clock-work. As soon as the receiver is full, the lever is lifted, and stops the descending pump in its course by turning off a very well ground-in valve, thus arresting the movement of the clock-work. The air from these two pumps passes through into the receiver or governor, as it is sometimes called. The receiver is so weighted as to give the requisite pressure to the air for driving it through pipes. From the air-holder the air passes through the carburettor, where it takes up the hydro-carbon vapour. The construction of the carburettor is very complete and effective, and serves either for air or gas; but those for gas have much less surface than those for air. The hydro-carbon, though highly volatile and inflammable, is not explosive. This hydro-carbon can be extracted from most of the commercial, hydro-carbon oils, such as petroleum, &c., but its manufacture is only known to the inventor and a few others.

In conclusion, I desire to call your attention to a most important subject, namely, that of street illumination; and I think that you will agree that there is great room for improvement in this branch of artificial illumination.

The present mode of lighting the public thoroughfares is very inefficient, inasmuch as the lamps now in use merely act in the distance as beacons, to show the line of demarcation between the road and the pavement, and when one is close to them they are comparatively useless, as nearly all the light is thrown upwards, and upon the walls of the houses, the place where it is not required; indeed, I have found it almost impossible to read a letter under the brightest lamp. The place where the light is wanted is in the road and on the pavement; and to remedy the present defect, I should advise the burners being placed horizontally, instead of perpendicularly, as they are now; the result of this slight and inexpensive alteration would be that the pavement and road would be well lighted, and none of the rays would be lost. I have, after several experiments, contrived a burner which is now alight in a lamp, also of my own design; it is very simple, not liable to get out of order, and shadowless. The upper portion, forming a concave reflector, is proposed to be made of enamelled iron, it being very durable, easily cleaned, and capable, in case of accident, of being replaced at small cost. The bottom is a semicircular glass globe, which, like the top, would cost but little to replace in case of breakage. The whole is connected to the pillar by a clamp and vulcanized india-rubber washer, and is so firmly fixed that the strongest gale of wind cannot affect it. The top reflector is fastened on to the globe by means of screws or clamps. The burner is in the form of two bird's wings, one of which is to give light on the pavement, and the other on the road. These burners can be constructed to pass the

usual amount of gas allowed for street lamps, viz., from four to five feet per hour. I wish it to be particularly understood that I have not spoken upon street illumination for the purpose of introducing this lamp and burner, but I have thought that it was time that such an important subject should be prominently brought before the public.

DISCUSSION.

Mr. King wished to ask Mr. Defries whether, in having two flames, as in the case of the burner he proposed, instead of one, for the street lamps, there was not a loss in the illuminating power? It was a well-known fact in gas lighting, that a single burner, consuming 5 feet of gas per hour, when divided into two burners, each consuming 2½ feet per hour, involved a loss of 25 per cent. of illuminating power. That would be found to be the case with the street burner now exhibited. He granted that the horizontal projection of the flame utilised the light; still, by the division of the flame in the manner shown, there must be a great loss of illuminating power. Having had considerable experience in the carburetting of gas, he might say, with reference to the apparatus before them for that purpose, and the remark of Mr. Defries that the oil was non-explosive, that he had mixed it with air in certain proportions, and exploded it with an electric spark.

Mr. Chaffins inquired whether the elegant-looking gas standard exhibited was much more costly than those now in use?

After a few words from Mr. Ashe,

Mr. Elt, on the subject of the present imperfect street lighting in the metropolis, said he thought the blame did not rest with the vestries and district boards, as had sometimes been asserted, as we were entirely in the hands of the gas companies in that matter. The local authorities made the contracts with the gas companies, but the servants of the companies lighted the lamps, and the vestries had no control whatever over the lamplighters. He did not wish to utter a word of suspicion as to the gas companies desiring to defraud the public in respect of the street lamps, but their servants were sometimes careless; and it was within the knowledge of all present that half the street lamps were not turned on so full as they ought to be. They were probably aware that great reforms in the matter of gas lighting in London were contemplated by the Government and the Board of Works, and he hoped one provision of the new measure would be to give the local boards more control over the public lighting than they had at present. For his own part, he thought it would be much better if the street lamps were so arranged that the tap, when turned on fully with a stop, should give the amount of light which was bargained for on the part of the public, and that the lamps should be lighted by persons under their control instead of by the servants of the gas companies. He was very much struck with the appearance of the standard for street lamps shown by Mr. Defries, but, as far as he could judge, it did not appear to yield so much light as the present single burner in the street lamps when properly turned on. That might be owing to the division of the burner into two. It must be admitted on all hands that there was considerable room for improvement in the existing lamp standards in London, both as regarded the pattern of the pillar and of the lantern. He was glad to find that in the City some improvement in this respect had already taken place, and he hoped the vestries and district boards of the metropolis generally would follow that example, and that, gradually, there would be introduced into the main thoroughfares standards a little more pleasing to the eye than the unsightly things now erected.

Mr. Webber thought the present mode of distributing gas through large iron mains was both clumsy and expensive. He thought some lighter and less costl material would answer the purpose.

Mr. Defries, in reply to the questions put to him, said, in the first place, with respect to the hydro-carbon used in the apparatus of Mr. Welch, his information with regard to its non-explosive nature was derived from Mr. Welch himself, and was confirmed by his own experiments. The secret of the manufacture of this hydrocarbon remained with those who had introduced it; all he could say was that it was perfectly unexplosive. In the next place, with regard to the alleged loss of 25 per cent. in illuminating power from dividing the burner into two jets, he would say that two lights even of less illuminating power when placed judiciously were better than one light of greater illuminating power placed injudiciously. With respect to the use of a lighter material than iron pipe for the main distribution of gas, the traffic was so great that any light material would be soon destroyed.

Mr. George White suggested that the lantern in the gas standard exhibited would, he thought, be improved by the upper metal portion being made a reflecting surface, and placed a little higher above the light. He quite agreed with the objections that had been made to the present form of the lantern in street lamps, which gave light above rather than below, and the shades of the bars cast beneath were perplexing to people of imperfect sight who might be crossing the road. He thought, with little additional cost, they might have a form of lantern which could cast the light where it was wanted, and obviate the gloom caused by these shadows. He would also say a word on behalf of the local authorities in respect of public lighting. To his own knowledge many of the vestries were very anxious to get a better-looking lamp-pillar than the one now in use, and he was pleased to see that the Society had had one brought there for inspection. He would like to see a competition of twenty or thirty designs of lamp posts, from which a good one might be selected. A great difference was observable between the public lights and those in the shop windows, which was no doubt in consequence of the more intelligent mode adopted by the shopkeepers in consuming the gas. He was further struck with the fact that in those streets which were the best lighted from the shop windows, the public lamps were always lighted a considerable time before those in the more private streets. He thought the reverse of that ought to be the case, and that in many of the main thoroughfares, consisting entirely of shops, many of them lighted by twenty or more burners, the public lamps did not require to be lighted till the evening was somewhat advanced, and when the shops began to be closed. He would say a word or two with regard to the position of the gas companies, and as to whether the Government should take up the question of the gas supply in the metropolis. He thought that public companies were often blamed when they did not deserve it. The introduction of gas lighting, as they well knew, was brought about by the enterprise of individuals who formed themselves into public companies, and, by the traffic in shares and the profits derived from the gas manufacture, made large sums; but they gradually became close corporations, doing very much as they liked as to the prices they charged for their gas. It was well known that gas was produced at the works at a cost of 1s. 8d. per thousand feet, and the expense of distribution was 1s. more—the remainder between that and the price charged to the consumer being profit to the company. It was true they were restricted to 10 per cent. profit, but they were not restricted as to the most economical modes of manufacture and distribution; and the limitation of the dividends under the monopoly in gas which now existed in London, did not tend to such a reduction in the cost to the consumer as they had a right to expect. Why should not gas lighting be thrown open to competition, and conducted on free-trade principles like any other

business? If that were done the public would take care to supply themselves with the best quality of gas they could obtain. Some people were in favour of putting this matter into the hands of the Government. He thought that would be only "getting out of the fryingpan into the fire," because private companies were amenable to public opinion, which would not be the case with the Government.

In reply to questions put by Mr. Blackie and other gentlemen,

Mr. Defries stated that the consumption of the two jets burning in the lamp before them was only $3\frac{3}{10}$ feet per hour, the standard of consumption in the present street lamps being five feet per hour, the lantern in the latter case being placed some three feet higher than was required for street lighting. The cost of the glazed portion of the lantern was not more than two shillings and sixpence. The first cost was less than that of the present lamp-posts.

Mr. King said, three or four years ago he drew the attention of Dr. Letheby to a lantern somewhat similar to that now before them, having a metal top and semi-spherical glass bottom, with a view to its introduction in the City; but an objection was taken to it on account of the gloomy effect produced above by the opaque metal top. It was well-known that coal gas depended for its illuminating power upon the quantity of carbon it contained; but they might overburn that carbon; and, to get the full amount of illuminating power out of the carbon which was in the gas, they must supply it with only the necessary amount of air and no more. If too much air was supplied the carbon was overburnt, and there was a corresponding loss of illuminating power. This was obviated to a great extent by the argand burner. With regard to the lamp before them, he believed it did not at that time give the light of more than five or six candles, whereas a public lamp was expected to give the light of twelve or thirteen candles. It was a question with him whether the horizontal position was the best one for the flame. If the gas were carburetted, and the flame placed in a horizontal position, it would almost fill the lantern with smoke. Care must always be taken to use a kind of burner which was suitable for the description of gas burnt. Gas rich in carbon required to be burnt through fine apertures; if large apertures were used imperfect combustion resulted.

The Chairman said, before proposing a vote of thanks to Mr. Defries for his interesting paper, which had elicited a no less interesting discussion, he would offer a few remarks on the subject. Mr. Defries had very ably treated the practical portion of the subject of gas illumination, but in the discussion reference had been made to what he (the chairman) considered a more important branch of the subject, namely, the question as to the propriety of the supply of gas being continued in the hands of the companies, or whether it should be taken from them and undertaken either by the City authorities or the Government as a means of improving the supply in respect of regularity and economy. Many persons present would recollect a few years ago there was a great effort made to obtain what was called a consumer's gas company in the City of London, which took the name of what it was intended to be in reality—"The Great Central Gas Consumers Company." The result of that attempt, in which all kinds of influences were used to show how inferior was the gas supplied by the old companies, and how important it was that the consumers in the City should have better gas at a lower price—the result had been to show that the company formed under such circumstances had gradually become as great sinners as the others, and were as anxious to maintain the price of gas as they had ever been. There was nothing more than a repetition of what had happened before. Complaints were made, not always based upon reason, and frequently not on fact, and in the end the public had to pay for the formation of this new company, and the interest of the capital expended in addition to what they paid before, without realizing the expected improvement in the quality, or economy in the price, of the gas. He did not think placing the monopoly in the hands of the Government or the Board of Works would give them gas so cheap or a supply so constant as when it was in the hands of half-a-dozen or more companies, who were anxious, by the good quality of the article they supplied, to secure customers on the one hand, and a good dividend for their shareholders on the other. As to free trade in gas, he thought they had it sufficiently already, as was shown by the inconveniences occasioned by the constant breaking up of the streets for the laying down of pipes. If the public were not satisfied with the gas of one company, they could, in many cases, take that of another. He was quite aware that the system of distributing the metropolis among the several companies had been carried on to a great extent, but there were still some localities where a supply could be had from more than one company. There was competition in the city, where the consumer had the opportunity of comparing the quality of the gas of one company with that of another. With regard to the lighting of houses and shops, the illustrations of the different forms of burner given by Mr. Defries that evening were highly interesting. The question of carburetting the gas was no doubt a difficult one on which to give a decided opinion. It had been adopted in many places, no doubt with great advantage, but he doubted whether it would be successful on a large scale. They had in the room in which they met the great advantage of that admirable system of lighting known as the sunlight, which not only afforded the best possible light, but at the same time aided in producing good ventilation. The magnesium, the oxy-hydrogen, and the electric light were useful under particular circumstances, and were interesting as matters of scientific experiment, but scarcely entered into the question of internal illumination. He thought they might look forward to great improvements in this matter if, as he believed was contemplated, the gas works were carried further out of London, and the sites of the present works appropriated to more profitable purposes. He looked forward to London being supplied with a better quality of gas, at a cheaper rate, under the influence of purely commercial competition, rather than as the result of any government interference. By the concentration of the gas works, a corresponding economy in the manufacture would result, and the public would receive greater advantages than would ensue from taking the business out of the hands of the companies and placing it in the hands of the Government, or in those of any centralised municipality. He had now only to ask the meeting to record their thanks to Mr. Defries for his able and interesting paper.

The vote of thanks was then passed.

Mr. Defries illustrated his paper by showing the various forms of artificial illumination, including the electric, magnesium and oxy-hydrogen lights, the Augasma light, and the various forms of gas burners, with the modes adopted for carburetting gas.

THE "COURSE" SYSTEM FOR LONDON CABS.

By John L. Haddan, Esq., C.E., Hackney Carriage Department, Metropolitan Police.

In the *Journal of the Society of Arts* for last week, Sir Richard Mayne, K.C.B., is reported to have stated that—"He considered the system of fares by the 'course' the one best calculated to avoid disputes; but he believed that to be inapplicable in a place of the vast extent of London, though at the same time payment by distance must necessarily lead to disputes, and, in the case of strangers, to overcharge." Acting on these words,

emanating from such an authority as Sir Richard Mayne, whose opinion, owing to so many years' experience, must be most valuable, the following plan has been devised, which it is believed fully secures the requirements and meets the objections which he has so justly pointed out as vital ones.

It is quite obvious that any system of fares to be convenient must also be approximate, for it would be an endless source of dispute, besides requiring very accurate means of calculating distances if a fare were computed according to the exact distance travelled; for instance, $1\frac{1}{4}$ miles, at the rate of 6d. per mile, would be $7\frac{1}{2}$d., a very inconvenient sum to pay, requiring small change.

The present system is also only approximate, a hirer paying the same fare for 1 mile 5 yards as he would for 2 miles, viz., 1 shilling.

The "course" unmodified would not be applicable to a large city like London. The same fare say, from Brixton to Mile-end, as from Langham-place to one of the clubs, would clearly not be sufficiently approximate.

There is no reason, however, why London should not be divided into a certain number of squares, or irregular figures, of about $1\frac{1}{2}$ miles area each; of which, within the four-mile radius, there would be 26, each square being distinguished by a letter of the alphabet.

The fare may be quite arbitrary, each square being considered a course; two squares, two courses; and so on; but, for the sake of illustration, I have adopted 6d. for each course or square, and only inserted 9 squares (instead of 26) in the tables:—

		W	
	A	B	C
			X
	D	E	F
			Y
	G	H	I
			Z

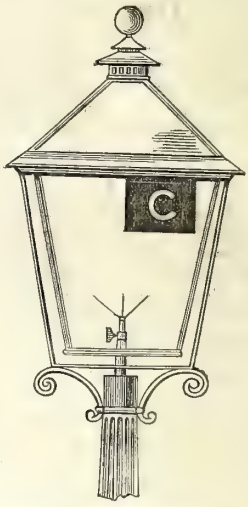
These fares are likewise only approximate, as in the one case the cabman might be hired, say, at Y and discharged at X, receiving 1s. 6d. for $1\frac{1}{2}$ mile distance (having passed into three courses), but from Z to W would be $4\frac{1}{2}$ miles, for which he would likewise only receive 1s. 6d.; this sum being found to be the exact mean fare for the two extreme distances, viz.:—

$1\frac{1}{2}$ miles at 6d.	=	0s.	9d. minimum
$4\frac{1}{2}$,, at 6d.	=	2s.	3d. maximum.
2) 6	=	2) 3s.	0d.
3	=	1s.	6d. average.

This, though quite just, seems, at 6d. per mile, rather hard on the driver; but it will be readily seen that by enlarging or diminishing the dimensions of the squares, or by altering their value, an exact scale can be arrived at.

Taking long and short fares together, the cabman would be the gainer, as for one person who went from extremity to extremity of a division there would be hundreds who took a medium course.

The table being compiled with the assistance of a map properly divided, the map, so far as the public is concerned, is dispensed with; the method of enabling the public to ascertain the limits of the various divisions must be more simple; and the method I propose is to have the initial letter of the district made of coloured glass, or cut out of tin, and affixed either to every lamp-post in



the metropolis or in the fanlight of every house—in the latter case the number of the house being also added, thus:



FROM									TO
A	B	C	D	E	F	G	H	I	
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	
0 6	1 0	1 6	1 0	1 0	1 6	1 6	1 6	1 6	A
1 0	0 6	1 0	1 0	1 0	1 0	1 6	1 6	1 6	B
1 6	1 0	0 6	1 6	1 0	1 0	1 6	1 6	1 6	C
1 0	1 0	1 6	0 6	1 0	1 6	1 0	1 0	1 6	D
1 0	1 0	1 0	1 0	0 6	1 0	1 0	1 0	1 0	E
1 6	1 0	1 0	1 6	1 0	0 6	1 6	1 0	1 0	F
1 6	1 6	1 6	1 0	1 0	1 6	0 6	1 0	1 6	G
1 6	1 6	1 6	1 0	1 0	1 0	1 0	0 6	1 0	H
1 6	1 6	1 6	1 6	1 0	1 0	1 6	1 0	0 6	I

EXPLANATORY.—On hiring a cab look at nearest lamp (say H); on discharging cab look at nearest lamp (say A). Refer to table—H to A = 1s. 6d. A foreigner can as easily do this as a native, no knowledge of site being requisite.

This plan quite prevents all chance of the driver going a roundabout way, his interest being to go as directly as possible; it also contains a very important feature, viz., that it states the exact legal fare from any one point to any other, and not, as at present, where, after going into tedious calculations and judging distances, the hirer arrives at what he imagines to be the right fare, but which he is by no means sure is the legal one; this, of course, renders disputes almost unavoidable—the cabman's idea of a mile being, naturally enough, the very opposite to that of the hirer. A foreigner or stranger must, of necessity, go to the wall under these circumstances. An index on a cab would never be in working order a week, it being the driver's interest to derange it as quickly as possible.

This system has the great advantage of being final, and not, as at present, subject to revision whenever changes of streets, &c., take place in the metropolis.

The plan and tables have all been worked out, the table only occupying a space of 9in. × 7in., in large type, is not too large to be affixed to the inside of every cab door.

All objections as to stoppages, rehiring, &c., during a course are met by the present system of hiring by time.

The cost of introduction would be but trifling, and the system might be in working order in a month.

Fine Arts.

New Courts of Justice.—The designs of the eleven competing architects are now on view in New-square, Lincoln's-inn. The chief purpose of the proposed new buildings is to concentrate the several courts of justice and the offices connected therewith, and the object of this concentration is to afford greater facility for the dispatch and accurate transaction of the law business of the country. The plot of ground on which the new law courts are to be erected may be described generally as lying between Temple Bar, St. Clement's Church, Lincoln's-inn, and Chancery-lane. The courts here to be concentrated are the Equity, the Common Law, the Probate and Divorce, the Admiralty, the Ecclesiastical, the Appellate Court, and the Bankruptcy Court. To these may be added "The Land Registry Office," "The Registry Office of Judgments, &c., affecting Land," "The Middlesex Registry Office," &c. Thus is made a total of no less than sixty-four courts, chambers, and offices. The printed instructions state that upon convenience of arrangement will mainly depend the success or failure of the concentration, and accordingly the architects have devoted no small pains to the ground plans and the distribution of the basement and floors above. Care has also been taken to obtain abundant light, to secure the quiet needful for the transaction of business, and the air essential to ventilation. The competitors have also been required to consider all points relating to acoustics, heating, water supplies, and prevention of fire. The detailed plans prove that much attention has been devoted to such arrangements, also to the no less important matters of ready ingress and egress, to the separation of the sight-seeing public from the profession, to refreshment courts, conference chambers, and generally to the convenience of witnesses, attornies, counsel, and judges. The plans also provide a substitute for Temple Bar, loftier than the present structure, in order to facilitate the traffic of the Strand; likewise a bridge on the north side, over Carey-street. These two bridges are covered ways, and will serve as means of communication with the Temple and Lincoln's-inn. In addition to these bridges, it is proposed that a tunnel or subway shall be constructed under the Strand, between the Temple and the new courts, on the site of Temple Bar; and another, large enough for foot passengers and trucks, under Chancery-lane into the Rolls estate. The architects have also been required to consider the means by which the increase of street traffic may be accommodated, especially on the side of the Strand. Each series of designs includes plans, drawn to a scale of one inch to 16 feet, of each floor, sections showing internal construction, elevations of each of the four sides or fronts, and a perspective or bird's-eye view. The architect also gives in words a general description of his design, of the materials to be employed, and of the mode of carrying the plan into execution. In few words may be designated the general architectural features of the eleven several designs. Without a single exception Gothic is the style adopted. Three of the competitors, viz., Mr. Street, Mr. Burges, and Mr. Seddon, have chosen somewhat castellated, domestic, or secular forms. One, Mr. Brandon, obviously leans to ecclesiastical skylines and details, as marked in a couple of spires, and a central hall not unlike La Sainte Chapelle outside, and the nave of Westminster Abbey inside. Mr. Lockwood's Strand façade is crowned by a lofty tower, which recalls the campaniles of Belgium and Italy. His use of coloured stones and certain other details have points of analogy in Giotto's Tower and the Cathedral of Sienna. It may be said, generally, that the designs, as a whole, indicate foreign—especially Italian—influence. A striking feature in Mr. Lockwood's plan is the central hall, which may vie with that of Westminster. It should also be observed that in the construction throughout there are no top or borrowed lights. Mr. Garling's towers are less prominent than most of his competitors, and he dispenses also with the central hall, which in other plans is wrought into a leading architectural feature. He is of opinion that a corridor better consults convenience. It may be remarked that Mr. Garling's is the lowest estimate. Mr. Deane, also, for convenience, breaks up his ground plan into distinct blocks. In this way he deems that light, ventilation, and ready access are more easily obtained. Mr. Waterhouse has followed, with modifications, the style of his own law courts in Manchester, which are quoted as precedents both by lawyers and architects. It is shown that his towers will form a striking group in the general view of the metropolis. The three remaining designs, viz., those of Mr. Abraham, Mr. Barry, and Mr. Scott, have this in common, that they surmount the central hall by a dome. In this country a dome is a new feature in Gothic architecture. In association with the pointed arch it is of Eastern origin; and Mr. Scott adopts the ogee curve, which the Saracens used at Cairo and elsewhere. It may be added that the highest of the ten estimates is above two millions, and the lowest slightly above one million sterling. Each competitor, except the successful one, receives £800. The architect whose plans are adopted will be paid 5 per cent. on the outlay.

Colonies.

Languages of the Australian Aborigines.—A Sydney paper says:—The Rev. L. E. Threlkeld wrote a work on the languages spoken by the Australian blacks, for the Great Exhibition of 1851; but little has been done since towards bringing them under those rules which govern that of more enlightened peoples. The Rev. W. Ridley, M.A., has, however, followed the example of Mr. Threlkeld, and compiled a grammar of the languages spoken by the aborigines of Australia, for transmission to the Paris Exhibition. This addition to philological research will be of interest to many in Europe, as the aboriginal languages are by no means insignificant in point of euphony or expressiveness. The author states that, limited as was his acquaintance with the several languages referred to, "he has met with abundant evidence of the remarkable regularity, and of the exactness with which the aborigines express various shades of thought. The inflections of verbs and nouns, the derivation and composition of words, the arrangement of sentences, and the methods of imparting emphasis, indicate an accuracy of thought, and a force of expression, surpassing all that is commonly supposed to be attainable by a savage race." The various languages treated of are—Kimilaroi, spoken by those who inhabit the country on the Namoi, Barwan, Bundarra, and Balonne Rivers, Liverpool Plains, and the Upper Hunter; Dippil, by the aborigines of the north side of Moreton Bay, and thence to Wide Bay, and the Burnett district; and Turrabul, the language spoken by the aborigines on the Brisbane River. There are also references to the laws of descent and marriage, and a comparison of the various languages. The work is illustrated with drawings.

Publications Issued.

The Water Question. By J. Bailey Denton, Principal Engineer to the General Land Drainage and Improvement Company. (*Edward Stanford.*)—This pamphlet consists of a letter, addressed (by permission) to the Earl of Derby, explaining a proposal for the supply of the metropolis from the higher sources of the Thames in conjunction with the storage of surplus

waters. The author begins by referring to the Rivers Commission, appointed the 18th May, 1865, "for the purpose of inquiring how far the present use of rivers or running waters in England, for carrying off the sewage of towns and populous places and the refuse arising from industrial processes and manufactures, can be prevented without risk to the public health or serious injury to such processes and manufactures, and how far such sewage and refuse can be utilized or got rid of otherwise than by discharge into rivers, or rendered harmless before reaching them;" and, next, to the proceedings of the Committee of the House of Commons of last Session on the Thames Navigation Bill, which resulted in a compact between the several water companies of the metropolis and the late Government, who were promoting the Bill, by which all towns on the banks of the river are to be prevented from discharging their sewage into it, and the water companies are, with that understanding, to continue to draw their supplies from the river on an annual payment of £1,000 each; both the proceedings of the Commission and the arrangement of the Committee being based on the assumption that it is practically possible to "prevent the pollution" of rivers. This the author regards as a fallacy, and he maintains that the only way by which the rivers can be maintained in their aboriginal purity, and in a condition fit to drink, is to exclude from them, wholly and completely, contaminating fluids; but, inasmuch as all fluids flow to the lowest place, and rivers occupy the lowest place in all water sheds, with the sea as their ultimate destination, it is obviously impossible to "prevent the use of rivers" for carrying off, in some shape or other, the refuse liquid of the towns and lands within their water sheds. The Rivers Commission, seeing this insurmountable difficulty, adopted the views of a previous Commission "for inquiring into the best mode of distributing the sewage of towns," and recommended that irrigation should be employed, as the best mode of lessening the obnoxious character of refuse fluids before they arrive at their natural destination. They state in their report, that "all expedients for disposal of town sewage other than by application to land, seem to us, on one ground or another, objectionable." They declare that "sewage water, if passed over a sufficient area of grass land, passes off bright, tasteless, and without smell;" and add, "that irrigation will be found to be the mode of dealing with sewage which results in the largest amount of good to the land, and the smallest amount of harm to flowing water." With regard to irrigation as a means of purifying rivers, the author quotes the opinions of some of the leading chemical and medical authorities, including Sir Benjamin Brodie, professor of chemistry in the University of Oxford, Dr. Voelcker, Dr. Odling, and Dr. Fuller, who all appear to agree in the conclusion that no process can render sewage available for drinking purposes. Mr. Denton shows that the natural *régime* of rivers admits of the supply of pure and the discharge of polluted water at the same time, and urges that "instead of straining after such irreconcileable objects as using river water to dilute sewage in order that we may drink it, we should draw the line between the upper portions of our streams which can be maintained in purity and the lower portions of the same, into which the refuse of towns and populous places must in some shape or other enter to be discharged to the sea." He goes on to say—"Perhaps of all rivers the Thames, in its upper tributaries, commands the purest and clearest of water; and for some length downwards from the rise of the springs, the streams are remarkably free from organic matter. If, therefore, it is a *sine quâ non*—as every one now admits it to be—that we should have in the metropolis a sufficient supply of perfectly pure water, we have, in the higher portions of the tributaries of the Thames, and in the supplies to be obtained by pumping and from storage, ample means of meeting all possible demands without going beyond the limits of the Thames water-shed. To abstract water from the tributaries without injury to the navigation and mills, and the general service of the river below, proper measures for compensation must be adopted, so as to return to the streams as much water as may be abstracted from them under a certain fixed datum of service height. The present consumption of London may be taken at one hundred millions of gallons per diem: about one-half is supplied from the Lea and from chalk springs on the eastern side, and the remainder from the upper Thames on the western. According to authorised published statements, the New River and East London Waterworks Companies have supplied, from the river Lea and from wells sunk into the chalk, nearly forty millions of gallons daily during the last dry summer; and under a strict conservancy of the Lea, they may continue to supply that quantity in a pure state instead of that in which it is at present. This quantity may, in fact, be regarded as a minimum, if storage, for compensation simply, be resorted to, and all sewage excluded from the river above the points of abstraction. By extending the system of storage to the collection of surplus water for direct service, the supply may be increased to a very much larger amount. Under a like exercise of conservancy and storage, there is no doubt that the other tributaries of the lower Thames may be made to contribute their quota. They consist of the Yedding, Brent, Roding, Hog's Mill Stream, Wandle, Ravensbourne, and Darent. The Kent Waterworks Company have shown that more than five millions of gallons daily may be and are obtained from artesian wells sunk into the chalk, and the Essex Pure Water Company are advertising several millions of gallons daily from the chalk springs at Grays. These figures show that we possess in the rivers and springs flowing from the chalk a valuable property within our own watershed which is by no means exhausted by the fifty millions of gallons supplied daily by the New River, East London, Kent, and Essex Pure Water Companies. The storage capabilities of the chalk streams are great when compared with the actual requirements of the population they would serve. For example, while the minimum daily flow of the Lea, at Field's Weir, during the driest month in the dry year (1851), in which the rainfall was 22·62, was about forty millions of gallons, the maximum, in the same month (October), was upwards of seventy-two millions; and the several streams rising in the chalk are all affected in like manner. But I will confine my observations to the tributaries of the upper Thames on the western side of London, rising for the most part in the oolite. The quantity at present supplied to the metropolis from the Thames, at Hampton, does not reach sixty millions of gallons daily. This will gradually increase, and it will not be many years before we shall require eighty millions of gallons, or more. To arrive, however, at the quantity of water for which provision must be made from the upper tributaries, we must have equal regard to the towns and villages dependent upon them as to the metropolis itself, and the whole supply should be viewed as one measure. The population of these towns and villages, was, by the last census, 179,884, and to supply this number of people with thirty gallons each will require 5,396,520 daily. This consideration will increase the present quantity to sixty-five, and the total future provision to, say ninety millions, to be obtained from the upper Thames. The area of land surface tributary to the Thames above Hampton is 2,352,640 acres; the average annual rainfall is slightly under 26 inches and the minimum 20 inches. As the total quantity of water required in the year for the population dependent on the upper Thames and its tributaries in 23,725 millions of gallons (*i. e.*, sixty-five gallons multiplied by 365 days), it follows that less than half an inch of rainfall over the whole area, or less than one-fortieth part of the minimum rainfall, will suffice to meet the present requirement." After describing some of the means by which the water at command may be economised, and a

considerable portion rendered available for storage, the author proceeds to speak of storage for compensation and supply. He says:—"The Thames and its tributaries are especially rivers of floods, and a single inch of rain falling in a day has been known to nearly double its volume when at its standard height. The proportion of the rainfall discharged annually to the sea by floods cannot be stated, but the minimum can hardly be less than three inches, or the quantity that has been represented as the perennial supply of the Upper Thames. This surplus alone will therefore amount to seven times the quantity required for metropolitan supply. It is difficult to state to what extent the storage of surplus waters may not be beneficially applied. It may be resorted to as a means of compensating the streams for pure water taken from them, as well as for direct supply. The extent of storage room that would be necessary would be 1,000 acres, of a mean depth of 20 feet, for the collection of water for direct supply; and 2,000 acres of a mean depth of 10 feet, for compensation." The following is a brief description of the works proposed by Mr. Denton:—"The head of the proposed works would be the fork formed by the Thames and Severn Canal (extending from its summit at Thames Head to its junction with the Thames at Lechlade) and the North Wilts Canal. It will be remembered that, during the last Session of Parliament, the Thames and Severn Canal Company sought powers to convert their canal into a railway. It was then stated and admitted that the canal was not in a profitable condition. It would be necessary to purchase these canals, and, by rebottoming, convert them into impervious conduits for the collection of pure water from the upper portions of the Churn, the Swill Brook, and the River Ray, and of such additional water as may be obtained by the restoration of the three millions of gallons which now runs into the Severn, as well as by additional pumping at spots, distant from each other, along the line of oolitic outcrop, whereby a considerably increased amount may be gained, which would otherwise be lost. Reservoirs would be made along the course of the three streams named, to afford compensation for the water abstracted from them. From Lechlade to the meadows just below Oxford (where it would be desirable to have a supply reservoir) a channel would be formed following the course of the Thames—paved with concrete, and embanked so as to allow of the utmost cleanliness and prevent the influx of surface drainage and flood water—which would act as a receiving conduit for the pure water to be furnished by the several tributaries which it will cross and meet on its way. The tributaries that would be crossed and met would be the Ampney Brook, the river Colne, the river Cole, the river Leach, the river Windrush, the river Evenlode, with the river Glynne, and the several minor streams which join the Thames above Oxford. At Oxford the receiving main would join the supply to be gained from the Cherwell and branches above the point of pollution, as well as by storage in reservoirs formed in the higher lateral valleys for direct supply. From the supply reservoir at Oxford another paved conduit would convey the water by Abingdon to a point near Wallingford, having received contributions of supply from the Ock and the Thame. From thence to Hampton the water thus collected would be delivered to the water companies' works by a covered channel, having received in its course the contributions of the Kennet River, the Lodden, the Colne, and certain springs rising near the main river, making up in the whole a supply of 80,000,000 of gallons daily. Oxford, Abingdon, Wallingford, Reading, Windsor, and the towns and villages on the banks of the rivers would have been previously supplied from the conduit as it passes by them to the amount of upwards of 5,000,000 of gallons daily. The open conduit, from its commencement at Lechlade to Wallingford, would be of a semicircular form. It would increase in dimensions as the tributaries added their quota to the volume. The covered duct would be 8 feet deep by 10 feet wide. The mean fall would be nearly 20 inches per mile. From Lechlade to the meadows near Oxford the distance is 29 miles, and the fall 48 ft. 6 in. From this point to a point above Wallingford, the distance 23 miles, and the fall 40 ft. 6 in. From thence to Hampton, the distance is 75, and the fall, 121 ft. 6 in.—Total length, 127 miles; fall, 210 ft. 6 in. These works on the upper Thames would be extended to the necessary conduits connecting the unpolluted portions of the tributaries with the receiving main, and would include the construction of reservoirs, the purchase of the special mills affected, and compensation to landowners, &c. On the Lea, of the lower Thames, a similar, though reduced system of works would be carried out. The cost of the whole may be estimated at £4,500,000, including interest on money expended and attendant expenses." In conclusion the author points out the objections to abstracting the waters of one district for the purpose of supplying another.

Notes.

The Metric System.—The Metric Committee of the British Association and the Council of the International Decimal Association announce that a conference with deputies of Chambers of Commerce and consular authorities in this country, for the purpose of promoting the practical use of metric weights and measures, and the introduction of an international decimal system of coinage, will be held on Tuesday evening, the 19th instant, at seven o'clock, in the Great Room of the Society of Arts, by permission of the Council. The questions more particularly to be considered are:—1. The legal position of the metric system in this country under the Permissive Act, without the corresponding power for stamping weights and measures of the metric system, and the legalisation of authorised standards of the same. 2. The introduction of metric weights and measures into the public departments, especially in the Post-office and the Customs; the official preparation of the tariff in metric equivalents, with authority to pay duty according to the same; and the preparation of statistics by the Board of Trade to represent the comparative value. 3. Means, which may be adopted by Chambers of Commerce for promoting the voluntary use of the metric system among merchants and manufacturers, such as the preparation of special tables for the various trades, for converting prices and quantities from the metric into the imperial system, and *vice versâ;* and the exhibition of a mural standard of the metre in public places in the principal ports and market towns. 4. Steps to be taken for securing representatives of the Chambers of Commerce at the conferences to be held in Paris in connection with the special exhibition of weights, measures, and coins, during the universal exhibition. 5. The conditions of the International Monetary Convention lately entered into between France, Italy, Belgium, and Switzerland, in so far as it may be applicable to this country. The conference is open to members of the Society of Arts.

Correspondence.

The Cab Question.—Sir,—I regret that I was unable to attend the important discussion opened by Mr. Cole last week, on the subject of the cab conveyances in the metropolis, or I should have submitted that the evils in question are remediable by the application of a large administrative principle, which I have elsewhere expounded in its application to several branches of administration, and have termed "competition *for* the field," as opposed to the common practice of "competition *within* the field" of service, which some eminent economists concur with me in repudiating. I consider

that all public means of vehicular communication by carriages plying in the public highways must be subjected to regulations and responsibilities on behalf of the public, and that the means of doing so, and preventing the evils in question, will be to charge some one administrative authority (and, in the absence of others, the duty might well be charged on the head of the police), with putting up the entire field of service to competition by tenders in answer to the invitation, as in the instance of the postal mail or packet service:—"Will you (individual capitalist, or company) undertake to provide the required and specific service for the public (the whole field), with what sort of cabs or other vehicles, and at what rates of fares, for a given period?" I here venture to quote a few passages from a paper expository of the principle as applied to several branches of administration, read by me before the Statistical Society:—

"The present condition of the cab service of London is one which appears to me to be so prominently illustrative of the evils of the competition of multiplied capitals within the field of supply, against which the opposite principle is the only effective preventive, that I beg leave to advert to them. The number of cabs now licensed in London is 4,500. Each common cab and the two horses, with the appointments requisite to work it, is estimated to cost not more than £60, so that the capital engaged is in round numbers upwards of £270,000, provided by upwards of 1,800 small owners.

"The waste of the capital committed by these competitions within the field of supply is visible to the eye at all times and all weathers—in full stands or long files, waiting hour after hour, and in the numbers crawling about the streets looking out for fares. The cost of the keep of each horse is estimated at 16s. 4d. per week; the depreciation of horse stock is put down at 2s. 6d. per week each, and of the vehicle at 8s. per week. The market value of the labour of such a man as the driver of a cab may be set down in London at 4s. per diem. The stable rent is at least 5s. per week per cab and horse, and with other minor items the capital invested for man, horse, and vehicle may be set down at about 1s. per hour lost during every hour during which the cabs are kept unemployed. On every cab stand where in foul weather, as well as fair, a dozen cabs are seen constantly unemployed, the administrative economist may see capital evaporating in worse than waste, at a rate of 12s. per hour, £7 4s. per diem—or at a rate of between two and three thousand pounds per annum, to be charged on some one—*i.e.*, the public. If all were employed, as the usual rate of driving is six miles per hour, they must be each employed at least four hours per diem to pay for their keep. If, however, the cabs were constantly employed daily, at least three horses must be employed, which would augment the charge by that of an additional horse at the rate of 4d. per hour. A large proportion of the cabs are employed during the whole 24 hours, but there are then two men, 'a night man' and 'a day man,' and three horses.

"It is probably a statement greatly below the fact, that at least one-third of the cabs are, the week through, unemployed; that is to say, one-third of the invested capital is wasted—a service for two capitals being competed for by three, to the inevitable destruction of one. As in other cases of competition within the field, efforts are made by violent manifestations of discontent at the legal fare, by mendacity and by various modes of extortion, to charge upon the public the expense of the wasted capital. Sometimes it is in the form of a piteous appeal, that the driver or the competitor has been out all day and has not before had 'one single blessed fare.' And yet the legal charge for the commonly wretched service of the man, horse, and vehicle is, when taken by the hour, nearly double, and by the mile nearly treble (when only two horses per diem are used) its actual prime cost, which, when driving, is at little more than six miles an hour, 2d. or 3d. per mile, and when waiting 1s. 4d. per hour. But there is now a cry from the cab proprietors that this charge of double the prime cost does not pay, as it probably does not under such a ruinous system. An appeal is proposed to Parliament for an augmentation of the fares; but such augmentations under this principle of competition within the field would only aggravate the evil, for it would lead to an increased number of competitors, and instead of there being a competition of three to do the work of two, there would be a competition of two or more to do the work of one—*i.e.*, a greater waste of capital to be paid for by some one.

"Since the reduction of the fares in 1852 the number of cabs in the metropolis, instead of being reduced, has been increased from 3,297 to 4,507 in 1857.

"If there were no legislative restraints, the extortion under the system of competition within the field would reach such a height as to go far to extinguish the service altogether, or confine it to cases of extreme necessity and very large means of payment. My friend Mr. Henry Ashworth, of Bolton, in an account of his travels in America, gives an illustration of this state of things. Speaking of New York, he says—'They have their coach-stands—coaches with two horses each, such as we formerly kept on hire, and the fares appear to be discretional, or according to bargain. Upon a rainy day the sum of two dollars, or 8s. 4d., was demanded as the fare for half-an-hour. I offered one-half the sum, and it was declined. I then pointed the attention of the driver to the string of 20 other carriages, all waiting to be employed, and remarked upon the uncertainty of his making any money at all within the next half-hour. He very coolly replied, "The rain is falling very fast, and I guess I'll spec it." He preferred to speculate upon the chances which might offer, and so I left him.'

"Examples of perfectly unrestricted competitions within the field are presented amongst the boatmen on the coast, when a belated traveller hurries from London, and presents himself to half a dozen or a dozen, say, of Deal boatmen, to be put on board a vessel just out of hail and on the point of starting. They see that unless the 'fare' is put on board he will lose his passage-money and his voyage, and instances have occurred where not one boat was to be hired for less than five pounds or more, to put him on board, or perform a service for which, at the rate of wages of men in regular employment of the class of the boatmen, as many shillings would be most liberal, not to say exorbitant remuneration. At Liverpool, where emigrant passengers are frequently belated, ships being delayed so long beyond their time that it is believed they will not start for days, when they suddenly do start, and a passenger on shore who has his wife and children on board, sees the ship turning past the rock, there the boatman's charges have arisen to such a height as to bring into competition steam-tugs, as being more economical as well as more certain.

"The execution of the laws for the regulation of the fares of watermen having been relaxed or fallen into desuetude, the charges of the watermen have so augmented beyond the legal rate as almost to extinguish the habitual use of boats on those parts of the River Thames little occupied by steam-boats or the larger craft, where conveyance by boats would be convenient or pleasurable,—if the charges were reasonable.

"At Richmond the boatmen require 2s. and 2s. 6d. per hour (sometimes, however, accepting 1s. 6d. for the second hour), which, at full work of ten or twelve hours, would give a remuneration of 15s. or 18s. per diem to labourers of a class to whom 5s. or 6s. would, for regular employment, be high wages. Double and treble the legal fares do not, however, satisfy the competitors, who charge their anxieties and discontents, as well as their losses, upon the public, for with all these extortions upon the public the condition of those engaged in such service is a wretched one. In the conflict of three men for the service of two, or of two for the service of one, anti-social feelings of the most malignant character are engendered, and in the necessity under which such people consider themselves to be placed of compensating themselves for the waste of their time and the risks of the competition, feelings are maintained of what I have characterised as a wolfish rapacity, to prey upon the necessities of all of the public who are exposed to them.

"In respect to this service of cabs—the analysed charges and statistics show that by a properly-conducted competition by adequate capital for the whole field—for which, in my view, the chief police or local administrative authorities ought, as servants of the public, to be made responsible—service equal to the present might be obtained at 4d. per mile; or at the present legal fare of 6d. per mile, a service approaching in condition to that of private carriages might be insured out of the mere waste which now occurs. Machines have been invented, which are stated to be convenient and not expensive, which, I am assured, measure time and distance, and determine for the passenger the fares to be paid, and register the earnings due to the proprietors. Under a system of competition for the field, such securities might be introduced. Isolated attempts to introduce such machinery into cabs have hitherto, even in Paris, been uniformly defeated by conspiracies of the whole body of the drivers. The machinery has been maliciously broken or spoiled by the drivers of other vehicles than those in which it was introduced. There are elements involved in the question, which may be referred to the moralist, who will agree that the waste commonly involves sin, malignity, demoralisation, as well as suffering. In this instance, the suffering is extended to the animals who minister to our convenience. The cab horses are driven mercilessly, and then returned heated to their stand, there to remain for hours exposed to cold and wet, and indeed they often have only variations of suffering when taken to the foul, confined stables of the small owners, which I well know are the seats of disease, and commonly the inhabitants of the mews, the first victims of the outburst of epidemics. The wretched existence of the cab horses is soon worn out. The lodgings of the men are commonly of a piece with those of their horses. It is my deep conviction, from observation, that whilst waste is sinful, sin, by the infliction of animal as well as human suffering, is wasteful. Hence economical science will be found to be a more powerful aid to beneficence than is commonly supposed. Mr. Bianconi, the great manager of horses in Ireland, received much applause from religious communities for only permitting those animals under his charge to work six days, that they might rest on the seventh day, but at our section of economic science, at the meeting of the British Association held at Dublin, he frankly disclaimed any other motive than his own interest, which was answered by a saving from the improved practice of 11 per cent. of his outlay for horses. My friend Mr. Whitworth, who has paid much attention to horses, declares that it is more economical to use up two light vehicles (as gigs) and one horse, than two horses and one vehicle. There can be no doubt that good, well-ventilated, and warm stabling for the horses, and better shelter and care during the day, would be economical of capital, as good sanitary dwellings would be to the men. Besides the economical, there are æsthetical considerations connected with this branch of administration; for until the people, high as well as low, have become less apathetic to the constant spectacle in the streets of animal decrepitude and suffering, as well as of human squalor, filth, and wretchedness—until they have become impatient of them and insisted upon their prevention, and upon having in their stead spectacles of wholesome, painless, and pleasant life and action, they are not in a proper state of mind for the reception of due impressions of the beautiful, or of external decorations which the votaries of high art desire to promote. For the achievement of these

improved æsthetical and economical conditions, large capital, as well as a more intelligent and superior public administration, is requisite. On a competition for a large field under the guidance of such an administration, I should expect that the public thoroughfares would be cleared of the cab stands, and the spectacle of the continued waiting of men and horses during inclement weather prevented, and that this would be done by the practice as respects the *voitures de remise*, which prevails in Paris, where in some of the streets only the head of one horse appears from a doorway to a shelter under which it stands ready harnessed, whilst others are in proper stables behind, ready to be harnessed as fast as the demand arises. The considerations of the traffic of a populous district, and of the condition of those engaged in it, would render it desirable to encourage locomotion by steam and the use of tramways through the streets. But judging from experience in Paris and elsewhere, there appears to be no probability of much diminution of the demand for horse-power for the minor traffic of conveyance in populous districts.

"There are large elementary distinctions, which I will mention here, of which I must avail myself on some other opportunity of displaying fully, between charges and payments as for services, and charges on and payments proportioned to the pressure of necessities. Payments as for service imply responsibilities to render that service in a proper manner, and those responsibilities are best brought about, as I may show more fully, by the principle of competition for the field; whilst charges made on necessities, and on estimates of the pressures and means of paying them, are sustained by monopolies, which are incident, and almost essential to the practice of what is called free competition within the field of service. In the case of the New York hackney coachman mentioned by Mr. Ashworth, the coachman, by the agreement with his fellows on the stand, had virtually an irresponsible monopoly of the service, giving him the power to exact payment according to his estimate of the travellers' necessities and means. In the case of a water supply, the actual cost of water for the supply of a water closet would be 6d. per annum if paid for as a service; but as a charge upon necessities or convenience, the companies levy 10s. each per annum, which forms a serious obstruction to the sanitary improvement of towns. And so with the Deal boatmen; and the character of the monopoly is similar, whether it be by the three cabs or the three omnibuses, to do what, under competition for the field, might be the service of conveyance of passengers by two;—or by two or three competing lines of railway, to perform a service which might be more responsibly rendered by one,—or by the seven originally competing establishments for the distribution of water, a service which might be best rendered by one on either side of the river, if not by one for the entire field. The results in these and other branches of service are common efforts and almost common necessities to charge the waste of capital upon the public, to create virtual multiform monopolies, and to impose, for the bad service, high charges exacted on private necessities."

I am, &c., Edwin Chadwick.

The Cab Question.—Sir,—The point that I adverted to in discussing the subject of the present legal cab fares, and their effect in rendering those vehicles of inferior character, has, I find, been misstated in the report of that discussion, given in the Society's *Journal*, where it is stated that I thought "the taxation imposed on cabs was, to a certain extent, compensated by the privilege of standing for hire in public places." Now, it was not the "taxation" on cabs that I referred to in my remarks, but the question of free-trade as bearing on a system of compulsory legal maximum of cab fares; I mentioned that question as being to some extent affected by the fact of cabs possessing the peculiar advantage above stated; but as, owing to the late period of the discussion, I did little more than hint at the point I wished to bring forward, I would now put it more explicitly. Although I quite agree with Mr. Cole that, as a matter of principle, the price of the hire of a cab should be left to be settled between the hirer and the person letting to hire, yet I fear that in practice the leaving this to be arranged between the individuals concerned, without any legal restriction, would be productive of great confusion and litigation; therefore it would seem desirable to consider whether there are not peculiar circumstances attending the matter sufficient to make cab-hiring an exceptional case; these are, that licensed cabs have accorded to them, by public authority, the exclusive right or privilege of standing for hire at certain appointed places in the public streets, and likewise the right of enforcing payment of the fares by a summary process before a criminal judge, which are things not incidental to matters of trade in general; hence it does not seem unjustifiable that these peculiar privileges or advantages should be allowed upon a condition or special public stipulation that the maximum amount of fare should be fixed by the licensing authority—in fact, it is a licence granted on certain conditions. That a compulsory arrangement should enable people to ride in cabs for so small a sum as sixpence is, to my mind, considering all the facts of the case, anything but fair treatment of cabby, and on this point of insufficiency of the amounts at which the fares are fixed seems to hinge the whole question of supply of good or bad cabs, for it is evident the present scale of remuneration is too low to induce capital to enter this field of enterprize. Hence the want of wholesome competition, and the consequent bad condition of the cabs; though, as Mr. Webber remarked, the perils of our crowded streets have possibly something to do with the state of these vehicles, and probably some arrangement for sheltering cab-stands would do something to help us to better cabs. A further point as regards this question of free-trade and cab-fares is, that there does not appear to be any legal obstruction to competition with the cabs in the form of the *Remise* cabs, such as are in vogue in Paris, because there seems to be no law to prohibit such vehicles from being stationed at standings provided by a company or private enterprisers, so long as the riders engage the vehicles at these standings, and not in the public streets. Whether this would be a paying speculation I cannot say, but there seems to be no law to prevent its being tried. I cannot conclude this communication without saying that Mr. Cole appears to me to have deserved the warmest thanks of every one for the able and impartial manner in which he treated the subject.—I am, &c., F. W. Campin.

Temple, Feb. 9, 1867.

MEETINGS FOR THE ENSUING WEEK.

Mon.....London Inst., 7. Prof. Pole, F.R.S., "On the Mechanical Structure of the Pianoforte and other Musical Instruments."
R. United Service Inst., 8½. Capt. R. A. E. Scott, R.N., "On the Rolling of Iron Ships in a Sea Way, and its Effects on Naval Gunnery."
Victoria Inst., 8. Mr. Evan Hopkins, "On Terrestrial Changes, and the probable Ages of the Continents."
Entomological, 7.
Medical, 8.
Asiatic, 3.
Society of Engineers, 7½. Discussion on Mr. Thos. Baldwin's Paper, "On Safety Valves."

Tues ...Civil Engineers, 8. Discussion upon Mr. W. H. Barlow's "Description of the Clifton Suspension Bridge;" and (time permitting) Capt. H. W. Tyler, R.E., "On the Working of Steep Gradients and Sharp Curves on Railways."
Statistical, 8. Major-Gen. Balfour, "On the Military Conscription of France."
Pathological, 8.
Ethnological, 8.
Anthropological, 8.
Royal Inst., 3. Prof. Tyndall, "On Vibratory Motion, with special reference to Sound."

Wed ...Society of Arts, 8. Mr. Thomas Beggs, "On the Water Supply of London as it affects the Interests of the Consumers."
Meteorological, 8.
R Society of Literature, 8½.
Geological, 8. 1. Mr. W. Boyd Dawkins, "On the Fossil British Oxen." Part II. *Bos longyfrons*. 2. Mr. G. W. Ormerod, "On the Geology of the Upper Part of the Teign Valley." 3. Mr. G. Clark, "Notes on the Geology of Mauritius."

Thur ...Royal, 8½.
Antiquaries, 8½.
Linnæan, 8.
Zoological, 4.
Chemical, 8.
Numismatic, 7.
R. Society Club, 6.
Royal Inst., 3. Prof. Tyndall, "On Vibratory Motion, with special reference to Sound."

Fri .....Royal Inst., 8. Mr. M. D. Conway, "On New England."

Sat .....R. Inst., 3. Mr. G. A. Macfarren, "On Harmony."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb. *Delivered on 17th August*, 1866.

Victoria, Australia—Further Correspondence relating to the non-enactment of the Appropriation Act, 1865.

Public General Acts—Caps. 58 to 122.

Delivered on 18th August, 1866.

441. Royal Academy—Correspondence.
485. Metropolitan Assessments—Returns.
499. Edinburgh Provisional Order—Sheriff's Report.
514. Irish Society—Return.
527. House of Commons—Return.
530. East India (Army)—Despatches upon the subject of Grievances of Indian Officers.

Delivered on 30th August, 1866.

68. (VII.) Trade and Navigation Accounts (31st July, 1866).

Delivered on 3rd September, 1866.

442. (A. II.) Poor Rates and Pauperism—Return (A).
427. Trade in Animals—Report and Evidence.
454. East India (Engineers' Establishment, &c.)—Returns.
482. Army (Flogging and Branding)—Return
484. Holyhead Harbour of Refuge—Return.
490. Revenue (Ireland)—Return.
498. Municipal Incorporation Act—Return.
501. Whitworth Guns—Return.
503. Petroleum and Shale Oil—Report.
510. Bank Notes—Return.
533. Secretaries of State for War—Return.
Abyssinia (Captives)—Further Correspondence.
Aldershot Camp—Report of the Army Sanitary Committee on the late Epidemic of Scarlet Fever among Children.

Delivered on 7th September, 1866.

160. (VI.) Election Expenses—Return.
322. Savings Banks—Return.
366. (I.) Vicarages and Curacies—Return.
449. Master and Servant—Report, Evidence, &c.
480. Standing Orders of the House of Commons.
481. Army and Militia (Flogging and Marking)—Return.
500. Royal Hibernian Academy—Return.
513. Japanese Currency—Reports.

Delivered on 12th September, 1866.

Public General Acts—Table.

Delivered on 14th September, 1866.

373. (I.) Theatrical Licences and Regulations—Index.
431. Mines—Report and Evidence.
493, 512. British Museum—Correspondence and Communications.
496. Election Petitions—Alphabetical List.
497. Metropolitan Water Companies—Correspondence.
Convict Establishments (Western Australia and Tasmania)—Annual Reports.

Session 1865.

473. Taxes Repealed, &c.—Return.

Delivered on 17th September, 1866.

254. Bill—Bankruptcy Law Amendment (as amended in Committee).

Delivered on 18th September, 1866.

Poor Law Board—Eighteenth Annual Report (1865-66).

Delivered on 21st September, 1866.

160. (VII.) Election Expenses—Abstract of Returns.
385. (I.) Writs Registration (Scotland) Bill—Index to Report.
391. (I.) Thames Navigation Bill—Index to Report.
506. Royal Naval Coast Volunteers—Returns.
507. Ship *Favorite*—Return.
520. Roman Catholic Orphanage (Norwood)—Return.

Delivered on 26th September, 1866.

New Zealand—Further Papers.

Delivered on 28th September, 1866.

353. East India (Chinchona Plant)—Return.
379. (I.) Edinburgh Annuity Tax Abolition Act (1860) and Canongate Annuity Tax Act—Index.
406. Friendly Societies—Report of the Registrar.
442. (A. III.) Poor Rates and Pauperism—Return (A).
531. Commons and Open Spaces (Metropolis)—Index to Maps.

Delivered on 2nd October, 1866.

68. (VIII.) Trade and Navigation Accounts (31st August, 1866).

Delivered on 6th October, 1866.

332. (I.) Art Union Laws—Index to Report.
459. Poor Law (Scotland)—Returns.
461. 0.119. Agricultural Customs—Report (of Session 1848 reprinted).
Colonial Possessions—Reports, Part I. West Indies and Mauritius.

Patents.

From Commissioners of Patents' Journal, February 8th.

Grants of Provisional Protection.

Ammunition lifters and carriages for—85—H. D. P. Cunningham.
Anchors—197—J. C. Haddan.
Artificial fuel—123—D. Barker.
Beton—77—M. Henry.
Blast furnaces—161—W. Clark.
Boots and shoes, lasts for—149—G. M. Wells.
Breech-loading fire-arms and cartridges for—89—W. S. Mappin.
Buoys—3238—F. C. Buisson.
Chimney tops—183—D. S. Chater.
Cigarettes, moulds for making—25—J. Wilkins.
Cotton bale ties—175—W. E. Newton.
Cotton, ginning—153—W. McAndrew.
Differential wheel gearing—125—C. F. Cooke and J. Standfield.
Draughts, &c., preventing—81—J. Hoadly.
Electrical apparatus—177—A. Apps.
Electric telegraphs—181—C. E. Brooman.
Fibrous materials, preparing—173—J. S. Dronsfield.
Fire-arms and ordnance, and cartridges and projectiles for—67—W. B. Robins.
Fire screens, &c.—104—E. B. Taylor and F. Winter.
Furnaces and fire-bars for—75—I. Kendrick.
Gas—73—F. J. Evans.
Gas and water mains, boring and tapping—145—A. Upward.
Guns, breech-loading—191—W. J. Hill.
Guns, projectiles, and cartridges—189—G. Clark.
Hats—185—W. E. Newton.
Heavy bodies, raising, &c.—159—J. Chrétien.
Highways, &c.—91—J. Reilly.
Knitting, looms for—93—W. E. Newton.
Lace—129—C. E. Brooman.
Lamps—137—J. Harding.
Lamps—171—A. Chamberlain.
Lead, separating silver from—87—W. G. Blagden.
Letter-boxes, &c.—169—W. Dennis.
Lingoes—127—E. J. Smith.
Locomotive and marine engines—3406—A. W. Makinson.
Materials, ornamenting, &c.—155—E. Tomlinson.
Materials, tinting—121—W. E. Newton.
Mines, ventilating—117—R. James.
Moulds—139—J. Bate and G. Asher.
Permanent way, packing—83—C. de Bergue.
Photographic transfers—71—A. G. Morvan.
Pipe moulding and casting apparatus—99—W. Clark.
Projectiles, ordnance, and arms—2530—T. Berney.
Pumps—69—E. T. Hughes.
Quays, &c.—79—H. Buss.
Railways, communication between passengers and guards on—3287—A. W. Hosking.
Railway sleepers and chairs—179—L. and E. Thornton.
Railways, permanent way of—115—J. Davies and A. Helwig.
Reaping and mowing machines—107—A. Hill.
Sewing machinery—113—J. Craven.
Sewing machinery—163—J. Northrop, and S. and W. H. Tetley.
Ships—95—R. Atkin.
Ships, propelling—135—R. R. L. Rosoman.
Spinning and twisting machinery—199—G. Haseltine.
Steam boilers—3390—R. Lewis.
Steam boilers, removing scum from surface of water in—15—J. W. Kenyon.
Stoppers—187—F. Hutchinson.
Tanning—131—J. G. Franklin.
Tools, &c., moving and working—105—M. Henry.
Turntables—165—H. Bridgewater.
Vapours, condensing—101—J. M. Hocking.
Vertical furnaces—111—J. Clayton.
Water, purifying—119—E. Süvern.
Weaving, looms for—141—J. J. and E. Harrison.

Invention with Complete Specification Filed.

Eyelets—260—W. R. Landfear.

Patents Sealed.

1421. G. J. Vincent.
1776. J. Brotherton.
1903. R. Mitchell.
2070. R. Leigh.
2071. H. Bell.
2072. D. Marchal.
2078. R. Wilson & W. Martin, jun.
2080. W. E. Gedge.
2095. J. Webster.
2237. W. Clark.
2917. E. K. Heaps.
2990. W. R. Lake.
3328. W. R. Lake.

From Commissioners of Patents' Journal, February 12th.

Patents Sealed.

2087. S. Alley.
2092. W. Brookes.
2100. W. Shaw and J. Connell.
2101. J. Cameron.
2106. W. C. Gibson.
2108. W. Smith.
2110. G. Payne.
2111. J. Holly.
2118. J. H. Johnson.
2127. J. Varley.
2136. W. Taylor.
2151. J. M. Hyde.
2244. C. D. Abel.
2337. R. A. E. Scott.
2338. R. A. E. Scott.
2465. A. Steven.
2580. J. von der Poppenburg.
3123. A. V. Newton.
3417. W. Smith.

Patents on which the Stamp Duty of £50 has been Paid.

335. J. C. B. Salt.
292. H. E. Drayson.
303. J. C. Dickinson.
331. E. Welch.
320. M. C. de C. Sinibaldi.
343. F. W. Webb.
344. T. S. Cressey.
419. J. Travis.
453. J. Howard, J. Bullough, and T. Watson.
99. S. Blackwell.
325. R. H. Napier.
360. J. H. Johnson.
365. I. Dimock.
380. T. Jackson.
510. J. Robinson.

Patents on which the Stamp Duty of £100 has been Paid.

367. H. D. Denison.
335. J. H. Johnson.
349. J. C. Lupton & J. Bleasdale.
356. T. W. Rammell.

Journal of the Society of Arts.

FRIDAY, FEBRUARY 22, 1867.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'Clock:—

February 27.—"On the Economy of Telegraphy as part of a Public System of Postal Communication." By Edwin Chadwick, Esq., C.B. On this evening Samuel R. Graves, Esq., M.P., will preside.

March 6.—The following subject for Discussion will be introduced by Mr. Christopher Cooke:—"On Storm Signals and Forecasts, their utility and public importance with respect to Navigation and Commerce."

Cantor Lectures.

The concluding Lecture of the course "On Pottery and Porcelain," illustrated by specimens of various manufactures, will be delivered by William Chaffers, Esq., as follows:—

Lecture VI.—Monday, February 25.

English Pottery and Porcelain.—Early History, continued to the beginning of the 19th century.

A Course of Lectures "On Music and Musical Instruments," by John Hullah, Esq., will be delivered as follows:—

Lecture I.—Monday, March 4.

Harmony.—Introduction—Greek Music—Mediæval Musical Science—Acoustics—Musical Sound—Vibration—Pitch—Harmonies—Resultant Sounds—Consonance and Dissonance—Tonality.

Lecture II.—Monday, March 11.

Melody.—Musical System—Tonality, Ancient and Modern—The Subdominant and Leading Note—Melodies in Imperfect Scales and in Ancient Modes.

Lecture III.—Monday, March 18.

Musical Expression.—Definition—Difficulties of Musical Composition—Realization of Unheard Effects—The Perfect Cadence—The Renaissance—Imitation—Expression, False and True.

Lecture IV.—Monday, March 25.

Musical Notation.—Different Systems, Alphabetical and Special—Neumas—Accents—Lines and Spaces—The Time Table—Modern Notation; its Origin and Growth, Simplicity and Fitness.

Lecture V.—Monday, April 1.

Musical Instruments.—Classification—Wind Instruments—Stringed Instruments—The Plectrum, Hammer, and Bow—Instruments of the Ancients—Mediæval Instruments; their Introduction into the Church.

Lecture VI.—Monday, April 8.

Musical Instruments (*continued*).—Modern Instruments—Chamber and Orchestral—Combination—The Modern Orchestra—Conclusion.

The lectures commence each evening at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend to each lecture.

Art-Workmanship Competition.

The works sent in competition for these Prizes are now placed in the Society's Great Room for the inspection of members and their friends.

Examinations, 1867.

In addition to the prizes announced in the Programme of Examinations, the following are offered:—

The Worshipful Company of Coach and Coach Harness Makers offer a prize of £3 in Freehand Drawing, and a prize of £2 in Practical Mechanics, to the candidates who, being employed in the coachmaking trade, obtain the highest number of marks, with a certificate, in those subjects respectively.

The Worshipful Company of Goldsmiths offer three prizes—of £5, £3, and £2 respectively—to the three candidates who, being employed on works in the precious metals in any part of the United Kingdom, shall obtain from the examiners the first, second, and next highest number of marks, such prizes to be distinguished as the "Goldsmiths' Company's Prizes."

Institutions.

The following Institution has been received into Union since the last announcement:—

St. Thomas's (Woolwich) Evening Drawing Classes.

Subscriptions.

The Christmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Food Committee.

The Sub-Committee on Meat met on Wednesday at 10.30. There were present—Mr. Benjamin Shaw (in the chair), Messrs. Harry Chester, Parish, C. S. Read, M.P., J. Ware, and E. Wilson. The meeting had before them a specimen of meat preserved in paraffine by Professor Redwood's process; two specimens of meat from Buenos Ayres, salted on Mr. Morgan's plan; specimens of Dr. Hassall's various preparations, flour of beef, meat cocoa, meat biscuits, &c.; *Extractum carnis* (Liebig) from South America, prepared by Liebig's Extract of Meat Company (Limited); from Australia, supplied by Messrs. Allen and Hanbury, Plough-court (Tooth's), Mr. Tindal, Mr. Hooper, Pall-mall, and also by Mr. Deane, of Clapham (two kinds), &c. The Committee proceeded to consider the best modes of testing, by experiments on a large scale, the nutritive

value of certain articles, and resolved to proceed with that part of their subject at their next meeting on Wednesday, the 27th inst.

The Sub-Committee on Milk and Fish met at 12 o'clock on the same day. There were present—Lord de L'Isle and Dudley (in the chair), Mr. Harry Chester, Lord Robert Montagu, M.P., Messrs. J. C. Morton, and J. Ludford White. The Committee resolved to seek, from the principal railways entering London, information relative to the supply and transit of milk; and Lord de L'Isle and Dudley and Mr. J. C. Morton undertook to procure information as to the system of cow-keeping as practised in the North of England and in Scotland, with regard to the supply of milk to the labouring classes.

Cantor Lectures.

"On Pottery and Porcelain." By W. Chaffers, Esq.

Lecture V.—Monday, Feb. 11.

European Pottery.

The lecture was illustrated by a large collection of choice examples of porcelain, and a label was affixed to each, stating when the manufactory was established and when it was discontinued, and diagrams of the marks were placed upon the wall. The lecturer commenced by explaining the properties of the porcelain of Europe, and the difference between the *pâte tendre* and *pâte dure*, or hard and soft paste, and the peculiar methods of painting upon the biscuit adopted by the artists. The first successful attempt in Europe to imitate porcelain was made at Florence, as early as 1580, under the auspices of Francesco I. de Medici, but it was not so hard as that of China; that is to say, composed of kaolin and petuntse, but a soft paste and translucent, which is one of the principal tests of porcelain. For some reason, the manufacture of this porcelain was abandoned after the death of the inventor. This Medici porcelain is now very scarce; there are not more than 30 pieces known. The mark found underneath these pieces represents the Cathedral at Florence painted in blue. The manufactory of Doccia was founded in 1735, by the Marquis Carlo Ginori, contemporaneously with the Imperial manufactory at Sèvres. About 1760 it rose to great importance, and large groups were executed from the models of the most celebrated sculptors. In 1821 the moulds of the Capo di Monte porcelain were transferred to Doccia. Venice was celebrated about the same time (1730) for porcelain, *soft paste*. There is in many of the pieces a great similarity between the decoration of Venice and Chelsea porcelain, and it has been supposed that workmen from Venice were employed at Chelsea; moreover, the mark of an anchor has been adopted by both. The manufactory at Madrid called "La Chine" was founded by Charles III. in the garden of his palace, called *El buen retiro*. It was organized by workmen he brought with him from Capo di Monte, and there is consequently a great resemblance between the products of the two fabriques, both being soft paste; the landscapes painted upon this ware are very artistic. The celebrated porcelain manufactory at Dresden, or rather at Meissen (in its vicinity), was established by Augustus II., Elector of Saxony, for the manufacture of true porcelain, that is, hard paste. The experiments of Tschirnhaus and Böttcher commenced about 1706, and to the latter is attributed the invention of hard paste. His first attempt was a red ware, like jasper, which was cut and polished by the lapidary, and ornamented by gilding; it was a fine stoneware, having the opacity, grain, and toughness of pottery. In 1708 Tschirnhaus died, and, shortly after, Böttcher succeeded in discovering the mode of making true porcelain by the accidental detection of the kaolin necessary for the purpose. Böttcher was born at Schleiz, in Vogtland, in 1682, and died in 1719, at the early age of 37. He was sent by his father to Berlin to study alchemy, and was considered a great adept in this occult science, and was even supposed to have discovered the secret of the philosopher's stone. After remaining some time in the service of William I. of Prussia, he became annoyed at the insupportable surveillance to which he was subjected, and fled; but he was arrested in Saxony, and the Elector detained him as a state prisoner; partaking of the credulity of the age as to the possibility of discovering the philosopher's stone, he resolved to test the powers of Böttcher, and sent him to the fortress of Königstein; subsequently he was removed to the Castle of Albretchtsberg, at Dresden. While there he continued his experiments, not altogether in the attempt to make gold, but in discovering the means of making true porcelain, and was, by a fortunate chance, enabled to discover the secret. The story is thus told:—John Schnorr, a rich iron-master of the Erzegebirge, in the year 1711, riding on horseback at Aue, near Schneberg, observed that his horse's feet stuck continually into a soft white clay, which impeded his progress. Hair-powder for wigs (made principally from wheat flour) was at that time in general use, and a careful examination of this earth suggested to Schnorr the substitution of it for the more expensive material, which was sold in large quantities at a cheap rate in Dresden, Leipsic, and other cities. Böttcher, among others, used it, but, finding it much heavier, desired to ascertain the deleterious ingredients, and analysed it, when, to his great astonishment, this ingenious chemist found in it the identical properties of the kaolin, which was the only thing required to complete his discovery of true porcelain. It was known in commerce as Schnorr's white earth of Aue, and was used secretly at the manufactory until the Aue kaolin was exhausted in 1850. In consequence of this important discovery, Augustus II. established the great manufactory at Meissen, of which Böttcher was appointed director in 1710, and about 1715 he succeeded in making a fine and perfect white porcelain. The first attempts to paint upon this ware were very imperfect, consisting of a blue colour under the glaze, in imitation of Nankin blue porcelain. It was under Horoldt's direction, in 1720, that paintings of a superior character, accompanied by gilding, and medallions of Chinese figures were introduced, and magnificent services completed. In 1731, Kändler, a sculptor, superintended the modelling of animals and groups, vases, &c., and other artists painted birds, insects, and copies of paintings principally of the Flemish school. From 1731 to 1756 the best productions emanated from the Dresden manufactory. Kändler modelled men and animals of the natural size, as well as peacocks, herons, pelicans, and other birds. Among the pieces produced about this time, by or under the direction of Kändler, at Meissen, was "The Tailor of Count Bruhl," mounted upon a goat, with all the implements of his trade about him. This vain man had a great desire that his likeness should be executed in porcelain at the royal manufactory, and his request was complied with, but not probably so as to gratify his vanity, for not only the tailor but his wife were thus immortalised, *aere perennius*, in porcelain. In 1754 Dietrich became director, and he was succeeded in 1796 by Marcolini, whose beautiful productions are well known. His period is always known by a star underneath the crossed swords. In spite of the precautions taken at Meissen to prevent the secret becoming known—the penalty being death, or perpetual imprisonment in the Castle of Königstein—some workmen escaped to reveal it elsewhere. Among these, a clever potter, named Stölzel, and a painter and gilder, Christopher Conrad Hünger, went to Vienna, in 1717, and were engaged by Claude du Pasquier, who obtained a privilege for 25 years. In 1744 it was purchased by Maria Theresa, and this was the period of its greatest pros-

perity. In 1785 there were 35 furnaces, employing more than 500 persons. This latter period is remarkable for the application in relief of solid gold platines exquisitely figured, and historical subjects, flowers, &c., finely painted. The mark used from 1744 to the present time is a shield of the arms of Austria. At a later period, 1751, William Gaspar Wegeley established a manufactory of porcelain at Berlin. It was carried on for eight years, but never remunerated the originator, probably for want of the requisite funds, and he abandoned it in 1761, but Gottskowski, a celebrated banker, became the purchaser, and, aided by his capital, it was brought to a flourishing state. Two years after, Frederick the Great bought the works, and it became a royal manufactory. Not content with ruining the Dresden *fabrique*, he expatriated many of the best workmen and painters to assist his own manufactory at Berlin, and transported not only the clay, but a great portion of the collection. Independently of this, and the better to insure employment for his 500 workmen, he restricted the Jews resident in any part of his dominions from entering into the marriage state until each man had obtained a certificate that he had purchased porcelain to a given amount. Höchst was early in the field as a competitor with Meissen in the manufacture of hard porcelain. A potter, named Ringler, who had escaped from Vienna, assisted in its formation, with Gelz, a fayence maker of Frankfort. About 1740, under the Elector John Frederick Charles, Archbishop of Mayence, the factory rose to great importance; and under Melchior, a celebrated modeller, from 1760 to 1785, the statuettes produced ranked among the first in Germany. The manufactory of porcelain at Frankenthal was established in 1754, by Paul Hanüng, who, having discovered the secret of hard porcelain, offered it to the royal manufactory at Sèvres, but not agreeing as to the price, the offer was declined, and they commenced persecuting him—for in that year a decree forbade the making of translucent ware in France except at Sèvres—and Hanüng was compelled to go to Frankenthal, leaving his fayence manufactory at Strasbourg in charge of his sons. In 1761 it was purchased by the Elector Charles Theodore, and it attained great celebrity. The Nymphenburg manufactory, near Munich, was established by Ringler, about 1756, and became a royal establishment shortly after. On the death of Carl Theodore, the Frankenthal works were transferred to Nymphenberg, and are still carried on successfully. The manufactories of porcelain at Furstenberg, Kronenberg, Fulda, Thuringia, Holland, and Russia, were next described, and, in speaking of those of France, the lecturer said the most celebrated for its early productions is St. Cloud. The china was altogether different from that of Dresden, being of soft paste, was established in 1695, and it may be considered the parent of all the porcelain manufactories in France. In 1702 letters patent were granted to the family of Chicanneau, which in 1712 were renewed, and M. Trou having married Chicanneau's widow, it was carried on in his name. In 1722 Trou's sons obtained a further grant, which was renewed in 1742 for twenty years more. Thus, the manufactory at St. Cloud being in active operation for upwards of 40 years, its products are by no means rare. They are easily known by their peculiar creamy glaze, and are frequently of an overlapping leaf pattern, called the "quilted china of St. Cloud," or painted in blue with a sort of arabesque border. The history of the celebrated manufactory at Sèvres must be traced back to that of St. Cloud, which, we have seen, was founded as early as 1695. Here Louis XIV. accorded his patronage and favour by granting exclusive privileges. In 1735 the secret of the manufacture was carried, by some of the workmen, to Chantilly, and for a time continued there by the brothers Dubois. They left in a few years, taking with them their secret, and settled at Vincennes, where a laboratory was granted them, but after three years they were dismissed. In 1745 a sculptor, named Charles Adam, formed a company, and the scheme was approved of by the king, privileges being accorded them for thirty years, and a place granted for their works in the Chateau de Vincennes. In 1753 the privilege of Charles Adam was purchased by Eloy Brichard, and Louis the Fifteenth took a third share—hence it became a royal establishment. Madame de Pompadour greatly encouraged the ceramic art, and it arrived at great perfection. The buildings were found too small to meet the increasing demands for their beautiful productions, and in 1756 they removed to a large edifice at Sèvres, built expressly for the company. The Vincennes porcelain is now much esteemed; a favourite decoration was flowers and birds, on a beautiful *bleu de Roi* ground, and cupids painted in camaieu of a single colour. The mark at first was the double L, without any letter denoting the date, and after 1753 (when the dating commenced) the letters A B and C are found enclosed within the cipher, after which it merges into the Sèvres category. In 1760 the king became sole proprietor, and M. Boileau was appointed director. By a decree of council, made in this year, Sèvres had the exclusive privilege of making porcelain, plain or painted, gilt or ungilt, ornaments in relief, sculpture, flowers or figures. Certain *fabriques* which had already privileges granted them, were allowed to continue their works of white porcelain painted in blue, with Chinese patterns only; the employment of any other colour, especially gilding, and making figures and flowers was strictly prohibited. Even the makers of fayence were prohibited using coloured grounds in medallions or otherwise, or gilding. About 1761 the secret of making hard porcelain was purchased of Pierre Antoine, the son and successor of Paul Hanüng, for an annuity of 3,000 livres (£120), and the manufacture of the *pâte tendre* being expensive, and liable to accidents in the furnace, it was deemed important to substitute hard paste. Although possessed of the secret they had not the means of producing it, being unable to procure the kaolin necessary, until accident led to the discovery of some quarries yielding it in abundance at St. Yrieix, near Limoges. In 1769, after Macquer had brought the ware to perfection, the manufacture was successfully established at Sèvres, and both descriptions of china continued to be made until 1804, when, Brogniart being director, soft paste was altogether discontinued, and declared to be "useless in art, of expensive manipulation, dangerous to the workmen, subject to great risk in the furnace, &c." In conclusion, the various porcelain manufactories of hard and soft paste in France were reviewed, and their peculiarities pointed out.

Eleventh Ordinary Meeting.

Wednesday, February 20th, 1867; Lord Robert Montagu, M.P., in the chair.

The following candidates were proposed for election as members of the Society:—

Busbridge, Walter, 4, Chester-place, Plumstead, S.E.
Guise, Francis Edward, 2, Middle Temple-lane, E.C.
Ingall, Charles, Mellish's Wharf, Limehouse-end, Millwall, E.
Johnson, John Robert, 31, Red Lion-square, W.C.
Keating, Lorenzo, 231, New-cross-road, S.E.
Kernaghan, B., 70, Bishopsgate-street Within, E.C.
Oliver, Thomas, 66½, Northumberland-street, Newcastle-on-Tyne.

The following candidates were balloted for, and duly elected members of the Society:—

Hawley, J. P., C.E., Lambeth Water Works, Brixton-hill, S.
Hewitt, F. K., London Joint Stock Bank, 124, Chancery-lane, W.C.

Howse, Thomas, 19, St. Paul's Church-yard, E.C.
Schofield, William W., Buckley Hall, Rochdale.
Stirling, Sir Walter, Bart, 36, Portman-square, W.

The Paper read was—

THE WATER SUPPLY OF LONDON, AS IT AFFECTS THE INTERESTS OF CONSUMERS.

By Thomas Beggs, Esq.

At the present time there are two questions engaging the attention of thoughtful and practical men, kindred in their nature, and together lying at the root of all sanitary improvement. The one is, how to bring an abundance of pure, soft water to our towns and populous villages; and the other, how to utilize the refuse. To the first of these my observations on this evening will apply. I do not presume to offer anything new upon a subject which has been so much discussed for the last twenty years. In fact, I believe that nothing new can be said upon it; but I indulge the hope that I may be able to place some of the facts and arguments which have been adduced in favour of a constant supply of water for London, in such a connexion as will, in some slight degree, assist the inquiry which is now before the recently-appointed Commission. I propose to treat the question from that point of view, regarding myself for the time being as a consumer of water.

It would be a waste of time to enlarge upon the gravity and importance of the subject. Recent events have again forced upon our attention the necessity of an improved water supply for the metropolis, but the statements as to the privations and sufferings of the poorer classes under the present imperfect system are only repetitions of those made by competent medical authorities before the Commission which made its report in 1844. So that for nearly a quarter of a century the condition of our people has been appealing against us. For that period no material change for the better has been made in their general condition. We are again awakened to the knowledge that there are in the metropolis entire districts almost shut off from the blessings and amenities of our civilisation, and only occasionally we obtain a glimpse of the destitute circumstances of the inhabitants when we are threatened by an epidemic. The habits, modes of subsistence, and the daily pursuits of these people, are as little known to our well-to-do classes as if they were the denizens of another hemisphere. When an invasion of cholera is threatened we are stirred into activity. Inquiries are hurriedly made, and we are startled at the presence of so much misery. Stimulated by the mingled feelings of pity and alarm, we organize committees, and make a liberal distribution of soup, blankets, and bread. We scatter our charities at the time with a profuse hand, and exhaust the resources at our command in measures of treatment. When the danger has passed away we relapse into our old habits of indifference. If the promises made in the hour of peril are remembered, we soon learn to dismiss them as troublesome, or find excuses for postponing or neglecting their fulfilment. We do not seem to profit by the reflection that, if all the means which are suddenly called into employment when an epidemic is at our doors, had been judiciously and leisurely employed in measures of prevention, we might very likely have escaped the visitation. It is always a serious evil to deal out large benefactions. They doubtless relieve the suffering of the moment, but they sow the seeds of future mischief, very often breaking down the independence of the labourer, and initiating his children into habits of vagrancy and mendicancy. We have other monitors besides those which reach us on the wings of the pestilence, and which admonish us as to the danger of permitting in our very midst the existence and growth of a large vicious and neglected class, who look upon the law as their enemy or oppressor, and upon the property of the industrious as their legitimate prey. Apart from all moral obligations, we have the strongest economical reasons for diminishing the numbers of the pauper and indigent classes, for they bring upon the community an inexorable tax, more heavy than any other tax levied for the maintenance of the state. Let us hope that the lesson lately taught to us will not be so utterly disregarded as many of those which have been taught to the nation in years gone by, and that we shall, in right good earnest, set about works of permanent and substantial improvement, amongst which stands in the foremost rank a constant supply of water.

In entering upon such an inquiry, it is necessary to guard against errors of inference, and especially against those exaggerated statements which obtain currency in periods of panic or excitement. As an example of such, I have seen comparisons made as to the mortality of different districts, ascribing the difference to the water supply. Nothing can be more fallacious than such comparisons. The higher death-rate in some districts over others is not due to one but to a variety of causes. If an abundant supply of pure water were given to the inhabitants of Bethnal-green, there would still be a higher mortality than in many of the West-end parishes, and this would arise from overcrowding and other causes known to prevail in densely-populated districts. A vitiated atmosphere is quite as potent an agent in the generation of disease as impure water. It is sufficient for our purpose that the supply of water to the metropolis is, under the present system, insufficient for all the reasonable requirements of the population. Without a good supply of water public and private cleanliness is impossible. Water in reasonable abundance is, in fact, essential to health, comfort, and decency. Under a scanty supply the poorer classes suffer the most, and they are the most helpless in preferring appeals for succour and redress. When we condemn them for slatternly and uncleanly habits, we ought in justice to compare their condition with our own. If a woman, the mother of a family, has to descend from an upper floor—from what is probably the living and sleeping room of herself, husband, and family—to a court-yard for all the water she has to use, the result will be great economy in the use of it, and that will soon affect all her other habits. This is unfortunately the condition of thousands in London, and under such circumstances it would be a marvel if the poorer classes were other than they are. We cannot say that they are placed in a fair position until a supply of water, sufficient for all reasonable purposes, is placed, if not in every room which forms a human habitation, at least on the floor of each house divided into separate tenements, so that the tenants may obtain water for domestic use without ascending or descending stairs to fetch it, or to convey away the water which has been used. I cannot but feel that there will be dereliction of duty on the part of every member of a vestry or district board, and indeed of every ratepayer, who allows this question to slumber, and who does not assist in the agitation for an improved water supply.

But there are other reasons for demanding an improved supply of water—namely, on the ground of its requirements for public purposes. I will take the case of fires. There is no place in the empire where it is of greater importance to possess an efficient machinery in the case of fires, and yet London is behind many second and third-rate towns in this respect. The increase in number of large edifices for public purposes, as well as of warehouses and manufactories, makes it imperative that the best mode of extinguishing fires should be adopted. In the metropolitan district there is an area of about 400 square miles, and there are nearly 500,000 houses. The increase of the value in property is even greater in proportion than the increase of population. The rateable value of property in 1862 was about £12,500,000; but in 1865 it had risen to £14,500,000. The total number of fires in 1866 was 1,338, of which 326 resulted in serious damage and 1,012 in slight damage. These figures show the importance of the question. The present system is this:—The fire brigade

is under the management of a central office in Watling-street, and there are branch offices in all the principal parts of London. At all these branches a staff of men is ready night and day, and an engine can be despatched from any of these offices in less than five minutes. I believe the average time is two and a-half minutes. The discipline is excellent, and all the appointments are in the most perfect order. The communications from office to office are made by telegraph. It is a proof of the steadiness of the men, that although the engines proceed at a gallop, a stoppage or accident in the streets is very rare. When the engine arrives at the scene of the fire, one of the wooden plugs—the precise positions of which are indicated by tablets fixed on adjacent walls or buildings—is drawn from the main, and a portable cistern, made of flexible material, and which is carried on the engine, is filled from it and kept charged, and from this the pump of the engine is supplied so long as its services may be required. The expedition with which these engines are started, conveyed to their destination, and prepared for active work, is a matter of astonishment to all who witness the operation for the first time. The men employed in the management of the engines and the distributing apparatus, and, in fact, all concerned, display such cool intrepidity and disregard of personal danger as to win general admiration. They display, in fact, the same high qualities—the firmness, steadiness, and resolution—which have always distinguished our soldiers and sailors wherever duty called them to go. All has been done for this service that skill and discipline can accomplish, and the whole arrangement reflects the highest credit upon the late Mr. Braidwood, and his successor, Captain Shaw, under whom the brigade has been brought to its present state of efficiency.

There is, however, an inherent defect in the system for which the brigade service is in no way responsible. It is inevitable that a loss of time that is of the greatest possible conequence in cases of fire must ensue. In Manchester, a hose and jet can be attached to a fire-cock and the water brought to bear upon the fire in about the time that is required to start a fire-engine from one of the London stations, that is:—the connexion of a hose and jet to the fire-plug does not take on the average more than two minutes. The value of the fire-cock system is demonstrated at once. I have not been able to ascertain the average amount of time that elapses in London between the first discovery and the water being brought to bear on a fire, but if the average be taken at half-an-hour, which is certainly rather under than over, then that half-hour is clearly lost; and in that space of time the Surrey Theatre was burnt down. From the extent which the fire in that particular case had progressed, and the rapidity with which the flames spread, it may be presumed that no human exertion could have saved any portion of the interior had water been supplied at the moment of discovery; but this was an exceptional case, and there have been instances in London where if water could have been brought to bear with the promptitude that is practicable in the towns where a system of fire-cocks is adopted, the fire would not have left the apartment in which it originated; and yet the time required to bring the engine and fit it for use has been sufficient to give the flames such an ascendancy as to defeat all efforts to subdue them. The saving in time of the difference between two and a-half minutes and half-an-hour would be often sufficient to arrest a fire that ends in a total wreck. There is a period in the history of every fire when a bucket of water properly applied would extinguish it, and every moment is of the utmost value. It perhaps cannot be made matter of accurate calculation, but I believe one-half of the property lost by fires in London might be saved if a system of fire-cocks were introduced. I believe that for the last twenty years no water works have been carried out in any part of the kingdom where fire-cocks have not been introduced as a part of the arrangements of supply. One of the best precautions is that of the proprietors of large establishments placing fire-cocks on their own premises. This arrangement is practicable, and is often carried out under the present system, but a constant supply would give greater facilities to private proprietors. There are other public purposes, the efficiency of which depend upon a constant supply of water, and on which space will not allow me to enter.

The superiority of a constant supply being acknowledged, the question will at once occur, why the Metropolis should not be supplied on a system that works so well in Nottingham, Norwich, or Wolverhampton. If it be applicable to a town of 50,000 inhabitants, why not to London with its 3,000,000. Mr. Bateman informs us that he has carried out the constant supply system in about 25 towns besides those in which he has been engaged as consulting engineer—towns with a population of from 7,000 to 600,000 persons, and a gross population of 2,000,000; and Mr. Hawksley, who was one of the first to carry out and enforce the advantages of a constant supply, has carried it out in about an equal number of places. Mr. Rawlinson has also carried it out in all the towns for which he was engineer. In all about 150 towns in Great Britain are enjoying the benefits of a constant water supply. Then why not London? It is said that a constant, which means an unlimited supply of water, could not be sustained from the excessive waste that would ensue, and that all the available resources at command would be exhausted under a waste going on night and day. This has been said in relation to every town, when a constant supply has been proposed. But I have partly answered that by showing the number of towns where the constant supply has been carried out, and it can be further answered by showing that the waste has been much less in the towns where a constant supply has been introduced than in those where an intermittent system prevails. In Nottingham, where Mr. Hawksley first introduced the system of constant supply, and where it is still retained, the consumption has been reduced to 14 gallons per head per day; and in Derby, under the same engineer, it is only 17 gallons. In Norwich I believe the quantity has been reduced to 12 gallons. Mr. Bateman informs us that the quantity used in the manufacturing towns of Yorkshire and Lancashire averages from 16 to 21 gallons per day. This is the general testimony, and the reduced consumption is easily explained. A constant supply necessitates the adoption of successful checks against waste and vigilant supervision, and I can see no reason why, with the same provisions, and under the same conditions, the consumption should not be reduced in London to the average of the manufacturing towns of Lancashire. If the difficulties are met with proper appliances and with determination, they will disappear as they have done in other cases. So far as quantity is concerned we have at present sufficient, if it be properly economised, to supply the requirements of London.

The subject is, however, generally argued as if the supply of London was insufficient in quantity and imperfect in quality. To remove these evils a number of schemes have been proposed, and upon each of them have been expended a large amount of time and no inconsiderable expense. Each of the schemes has its supporters, and the gentlemen who have prepared them are well able to expound and defend them. They propose to bring a supply of water sufficient to supersede all the present sources of supply; and these schemes come recommended to us as the proposals of men of high professional reputation. I will only name a few; and as my object is not to discuss the merits of any, I shall be pardoned for not naming all the schemes which, for the last twenty years, have been laid before the public. Mr. Homersham proposed to supply London from the neighbourhood of London itself, and a proposal was made for a company—the London Watford Spring-Water Company; and a Bill was prepared, and read for the first time in the House of Commons, on February 6, 1850.

Mr. Bateman proposes to supply us from a source 183 miles away—from the sources of the Severn. Messrs. Hemans and Hassard take us a still greater distance, and propose a supply from Ullswater, a distance of 240 miles away; and Mr. Bailey Denton proposes to obtain a sufficient supply from the Thames watershed. Whether any or none of the plans are adopted, the discussion which must ensue will be of immense advantage in bringing every phase of the question before the great body of consumers. I will only plead for each of these plans to this extent—that the consideration of none of them should be dismissed on the grounds of distance or expense. This plea often prevails when works of utility are before us, and which involve a heavy first cost, but a more unwise economy could not be practised. I will take the plan which appears to be the most expensive—that of Messrs. Hemans and Hassard; and I believe that every intelligent person who has given attention to the subject will admit, that if it can be shown that we have not at present a sufficient supply of water in London, and that a supply cannot be got at a less distance than the lakes in Cumberland—and that it can be got there in sufficient quantity and purity, then that the £25,000,000 which is the amount they ask for the completion of the works, would be a wise expenditure, and that the interest of the money will be less in amount than the annual loss arising from an imperfect system of water supply. There is no doubt that we shall exercise due caution before we commit ourselves to so serious an outlay, but the heavy cost ought not to be put in the balance against the health and comfort of the community.

Now what are the real difficulties in the way of carrying out a system of constant supply for London? It is not for want of plans, nor of engineering and mechanical skill—nor yet for the lack of enterprize among our people, nor assuredly for the dearth of capital. Then where is it? In entering upon it, I must say that the question has always, as it appears to me, been discussed with much unfairness towards the existing water companies. They are spoken of as huge monopolies, standing in the way of all improvements, and making large profits out of one of the first necessaries of life. I am almost ashamed to repeat some of the arguments which are in common use, but I am induced to do so, because reducing them to the simplest shape is really to answer them. It is objected by some that water is sent by a bountiful Providence, like air, in the greatest abundance, and that it should not be made an article of commerce, like coal or gas. They contend that the water costs nothing, and that it ought to be given to the people, under municipal arrangement, at a nominal price; and on the strength of such reasoning they would call upon the legislature to supersede the water companies, and establish some other machinery in their stead. In a commercial age, and among a commercial people, such arguments will weigh for nothing with those whose intelligence really influences and directs the legislation of the country, and the sooner they are dismissed from the minds of the consumers the better. The case of the water companies appears to be this—They were incorporated under a very different state of things to the present; when the style of living and ideas of comfort were altogether different; and when there were no municipalities having the disposition or the power to carry out any general schemes of water supply. If we go back even so far as the commencement of the present century, we must admit that the men who came forward to embark their capital upon works of public improvement were public benefactors, and the property they have created is entitled to the protection which the state affords to all kinds of accumulated corporate property. As to the profits made by the companies, they are not large, and scarcely such as would satisfy a large capitalist in any large undertaking. The weakest of all arguments is that which is founded upon the abundance and first cost of the article. The water companies charge for the water, it is true, but the charge has to cover the cost of bringing the water from a distant source, where it is really of no commercial value, into the homes of the London public. The water-rate in fact covers the cost of whatever arrangements the companies may enter into to secure the original supplies, the canals by which it is brought into the field of consumption, the filtration, the pumping, the laying of large mains and service mains, the formation of reservoirs, and all other parts of the machinery of construction and maintenance. If for a moment we cease to call them water companies, and look upon them as water carriers, we shall then see more clearly what the revenues they receive have to cover. A gallon of water weighs ten pounds, so that a family of five persons, according to the average London consumption, which we may take at thirty-two gallons per head, have brought into the house, if the internal arrangements of the house are in perfect order, without any trouble, either as to the conveyance or as to the delivery, 1,600 lbs., or nearly three-quarters of a ton, or 320 lbs. weight for each person daily. It may be instructive to give a few simple calculations, so as to bring the matter more clearly to the mind. The 108,000,000 gallons brought into London daily would fill a lake 3,000 feet long, 200 feet broad, and 30 feet deep; or we will take it in another shape—it would fill a canal 10 miles long, 35 feet broad, and 10 feet deep. The total weight would be nearly 500,000 tons.

As to the quality of the water, I do not wish to enter upon that inquiry, as the question can only be settled by scientific investigation, but I believe that an injustice is done to the London companies, by the condemnation of the water supplied by them, and in this way:—The water submitted to test has been, in many instances, taken from the service cocks after leaving a cistern, and assumed to be in the state in which it left the mains. If the water that is subjected to analysis be taken from the mains, then I think that it will bear a comparison with the water that is supplied to many towns where the constant supply system prevails. I have detected gross impurities in thewater at hotels in Manchester, but the supply from the service might be pure for all that. Much of the impurity of the London water is attributable to the state of the cisterns and other receptacles for storage in common use. Many of the cisterns are old tubs and barrels, unfit for the purpose, to begin with, and rendered foul by long use without cleansing of any kind. Many of them are so fixed that they receive the drainage from roofs of outhouses, the rain water, and percolations from defective walls and gutters. Many of these, of a better construction, have an overflow pipe running into the soil-pipe of the water-closet. They are so placed in the majority of cases as to receive the emanations floating in the atmosphere. It is one thing to take water from one of these receptacles, and quite another to take it from a properly-constructed slate cistern, carefully protected from the admission of foul and deleterious matter from without. It is a powerful argument in favour of a constant supply, that it would necessitate a thorough revision of all the cisternage of London, and the removal of all cisterns which are unsuited to the purpose. While the present system continues it is not fair to blame the water companies for those defective arrangements, over which they have no control. I say this in fairness to the water companies. But I say, further, that if they are not able to give a constant supply, then it is clear that they must stand out of the way, and leave it to others to undertake the work; but if, as I believe, they have both the will and the ability, then it is incumbent upon us to consider how far the interests of the general public would be served by superseding them, and creating in their place some new and centralised authority. Of late years the London companies have given much attention to the subject of constant supply, and are now making diligent inquiries on the whole question. In many cases the companies are giving a constant sup-

ply, where satisfactory arrangements are made to guard against waste; and the language they employ is this:—"We will undertake to give a constant supply, to meet all the legitimate wants of London—if we can find security against ruinous waste."

I think the companies exaggerate this difficulty; but it is one of great magnitude, and one that must be carefully considered. There are facts enough to create dismay if they are looked at without the light that is thrown upon them by the experience of the provinces. I observe, in all the valuable papers that have been contributed on this subject, that a deficiency of quantity for the supply of London is in all cases assumed, and the present quantity is taken as the basis of all calculations of supply for the future. Now what are the facts? The quantity consumed in London is, as I have said, 108,000,000 gallons per day, which gives an average of 231 gallons per day to every one of the 470,000 houses supplied, and for its 3,000,000 of population 36 gallons per head for every man, woman, and child, or something more than double what is delivered under the constant supply system in many of our large manufacturing towns. Of this immense consumption it may be safely said that two-thirds are wasted, but if we take it at one-half, if we could reduce the consumption, by saving the waste, to 18 gallons a day per head, then we shall have an available daily surplus supply of 54,000,000 gallons to meet the wants of an increasing population, and the demand of those luxurious habits which always grow with the means of their gratification. I have been surprised that this view of the case has been so much overlooked. The poorer classes are not deprived of a sufficient quantity of water because there is not enough in our present resources, but because the whole of the community makes an improper use of that which it obtains. Their privations arise not from deficiency of quantity, but from waste. As I have said, I cannot see why the London public should use more than the public of Manchester, if proper precautions were taken against waste. Carelessness in the use of resources leads in this case, as in most others, to profusion, and the homely adage is verified that wilful waste makes woeful want. The worst of it is that the careful and the prudent have to suffer from the carelessness of the improvident.

This is the vital question—the one which includes the other questions involved in a water supply for London—and we shall be all the better for looking at it boldly. In London it is well-known that the negligence and dishonesty as to water fittings are most flagrant. For the sake of a copper ball or a brass service-cock, which may be sold for a few pence, they will be torn from their places, the other parts of the service seriously damaged, so that the water runs to waste, and so continues for days until detected by an officer of the company. An intelligent audience would scarcely give credit to a report, if such could be made, as to the extent of mischief of this kind. This is one cause of waste, but the greater cause of waste is the negligence of all classes of the population, and by no means the vice of the poorer classes alone. No value seems to be attached to water, and the utmost recklessness prevails. I have known instances, in towns where the constant supply system exists, of respectable persons, on the mere suspicion that a foul smell came up through the outlet of a wash basin, turn a tap and leave it on all night; and no doubt it was an aggregation of acts of culpable recklessness like this which created apprehensions in Mr. Bateman's mind as to the Glasgow Water Works, and induced him to represent to the corporation of that city, that if the consumption continued, which at one time had reached 47 gallons per head, the resources of Loch Katrine would fail to meet it. Nothing is more common than to find a stream of water running from a broken or defective ball-cock, or a service cock of a bad construction, or which is out of repair; that one cock wasting in the twenty-four hours more than is due to the fair consumption of a family. Very few persons have any idea of the amount of water that may be wasted in this way, serving no useful purpose whatever. I will illustrate this by giving the results of actual experiments made by two independent persons besides myself. In each case a leaky cock was taken, when dropping only—such a cock as is usually placed over sinks—and it was found that such a dropping would consume half a gallon per hour, or twelve gallons per day, a larger quantity than is due to any adult person who does not use a bath. By dropping I mean such a series of drops as would not make a continuous stream.

This waste can be largely reduced by vigilant supervision and the introduction of superior mechanical water-waste contrivances. The habits of the poorer classes do not present an insuperable difficulty, for those habits may be overcome. The poorer classes are most unfairly used, and then the evils which arise from neglect are urged as reasons why no effort should be made to remove them. Look at the habitations into which the poorer classes are crowded, and the fittings which are left for their use. Cleanly and orderly habits are impossible, and a constant deterioration is going on. The introduction of better appliances must precede the proper use of them, and, as in all other cases that I am acquainted with, they will learn how to use and respect such improved appliances when given to them. It is disgraceful to retain the butts and water-closets which at present exist; and I believe that it would be attended with beneficial results if the water rate was in every instance levied upon the landlord, making him responsible for all defects of construction, all mal-arrangements, and all waste. For a great number of years the manufacturing skill of this country has been engaged in perfecting contrivances for the prevention of waste; and I speak with the greatest possible confidence when I say that I believe a constant supply of water in London is perfectly practicable, and that it might be brought about with a much less consumption of water than that which is now consumed. Improvements in habits, and consequently in morals, have always followed improved dwellings and improved sanitary arrangements, and this is the great encouragement to perseverance in a good work.

The next important question before us is that which affects the administration of an improved water supply. In whose hands are the powers of a new Act of Parliament to be lodged? This question might be set at rest by the present companies undertaking to give a constant supply, and I believe that they would be supported in any application made by them for extended powers to enforce restrictions upon waste. Their interests in this particular are identical with those of the consumers. They desire to prevent waste, as that diminishes their supply, and reduces the pressure, and produces irregularity and confusion in all their arrangements; and they desire also to get paid for all that is supplied. The consumers are interested in the prevention of waste, as they have to pay for that which is wasted as well as for that which is used. There ought really to be no antagonism between the supplier and the consumer of the water. If the companies find insuperable difficulties in providing for constant supply, then I think that the public will not be content with things as they are, and that Parliament will be called upon to pass some enactment that will enforce what is demanded; and then, as I have asked, in whose hands are the powers of administration to be lodged?

As it is impossible that in a matter of water supply there can be competition, the alternatives are very few. Competition has been tried, and the evils were found to be so great, arising from two different companies laying mains over the same district, and often in the same street, that neither Parliament nor the public would listen to any proposal to resume so objectionable a principle. Then there are three courses open to us:—The first, which finds favour in many quarters, is that of appointing a commission to govern the water supply; the second, is that of placing the government of such

supply in the hands of the Metropolitan Board, or whatever other central Board may be appointed under a new system of local government for the metropolis; and, the third, is that of leaving the water supply in the hands of the present companies, enforcing a constant supply, but giving them further powers to make provision against waste, and substituting another and a fairer principle of rating for that which is adopted at present. All these proposals I intend briefly to notice.

Those who support the supply of water being placed under the government of a commission, invariably take us to Paris, as an instance of what central authority can effect. I am willing to admit, having examined the system adopted in that city, that in some respects their arrangements work better than our own. In relation to their provision as to fires, they have in all their large buildings a preventive service; and such fires as those which ended in the destruction of the Covent Garden and Surrey Theatres, could not have occurred in any of the Paris theatres without the most criminal neglect. They provide, in fact, for each theatre a small fire brigade, of three or five men, as the circumstances of the case may require, whose duty it is to keep a vigilant watch night and day, to remove all rubbish and waste, and everything of a combustible character, to look after the gas, and. especially during the hours of performance, to keep watch upon the machinery and stage effects. These men have dormitories in the theatre, in which are fixed a number of alarums, so that in case of fire at any hour, they are advised by the men on watch as to the part of the theatre where their services may be required. They have wet blankets, mops, and all other apparatus provided and ready. At a moment's notice they can have water ready to pour upon the fire under pressure, by means of a cistern made on the principle known as that of the Hiero's Fountain. The whole arrangements are complete, and the discipline unexceptionable, and may be studied with the greatest possible advantage by the London community. In other respects, as to watering and cleansing roads, the plans in operation in Paris might be adopted in some of the suburbs, if not in the busy parts of London with advantage; and there is a profusion of water for all purposes of public display and luxury; but when we go among the homes of the people, we find all the defects so glaringly exhibited amongst our own population. Thousands of the Parisian population have no resource but a temporary stand-pipe, which is fixed for a short time in the morning of each day in the streets. The quantity of water supplied to Paris is about 50,000,000 gallons per day, so that the population being little more than half that of London, the number of gallons to each person is about the same in each case. The waste, as in the case of London, is enormous. I have myself seen from defective stand pipes and valves an amount of water running to waste in the streets of Paris sufficient for the supply of a whole district. Under the chief engineer, M. Belgrand, great improvements have been effected, and the citizens of Paris are largely indebted to his energy, skill, and perseverance. Commercially, however, I regard the system as a failure. It has under the present government acted upon the generous principle of providing water for the poor gratis, and the expenses are paid out of the city rates. We have recognised an analogous principle in London in our system of rating—that of making the richer pay for the poorer classes. As a rule, the adoption of all such unsound and uneconomical principles leads to grave errors in practice; and I am sure that it has done so in relation to the water supply for both London and Paris. The poor, as a class, are never benefited by such regulations. What severe pressure would be laid upon the poor man if he paid 4d. per 1,000 gallons (for that is really what the London companies receive for the water they supply) for all the water he used, and was relieved from a payment for that which his neighbour wastes? The quantity required for a workman's family could not be more than 25 gallons per day. People seldom care for that which is given to them; and I believe the interests of the poorer classes will be best promoted by exacting payment in some shape or other for everything they consume. We must, in order to relieve the necessities of their condition, learn to give them justice rather than charity.

I do not admit that, as a whole, the administration of the water supply in Paris is better than our own, or that there is anything in it to attract us to a centralized government. If there were, we have to consider that institutions of foreign growth may not be congenial to our own country. There can be no greater mistake than to suppose that the institutions which succeed well in one nation may be copied by another. Institutions are not made; they grow; and everything depends upon the genius of the people among whom they are attempted to be founded. In this country we may enjoy an inconvenient amount of freedom, but we have become attached to that freedom; and, with all its grievous defects, local self-government has done much for us, and become a part of our national polity. It is well not to attempt violent changes when they interfere even with the treasured prejudices or attachments of a people. We have tried government by commission in this country, but without any success in any case. We had a short-lived Commission of Sewers in Greek-street, and subsequently we had a hastily improvised Board of Health. The latter, after a few years' desperate struggle for existence, came to an untimely and inglorious end. Let us be cautious, then, in promoting the creation of dominant bodies, who are not responsible to the public whose interests they are called upon to protect. There are undoubted evils connected with large trading companies, but they will be found less than those arising from centralized authority, as they are more easily grappled with and overcome.

The next plan suggested is that of vesting the control of the water supply in the present Metropolitan Board, or in any similar Board that may arise out of the reconstruction of the local government of the metropolis. The argument to sustain such a plan is that the water supply ought to be made a matter of municipal arrangement, the rates being debited with the expenses, and credited with the receipts from the water rates. We are taken to Manchester, the Corporation of which makes a profit out of the supply of water. The public are often misled on economical questions by looking at that which is seen, and not looking into that which is unseen. In this case we see the profit, but we do not see the various items on the other side, which would fairly constitute a *per contra* account, and make it questionable whether the Manchester people are really benefited by the arrangement. There are people of weight and intelligence in that city who contend that the arrangements as to water and gas are not quite so economical as they appear. It must also be said that there are places in the empire where the same arrangements as are now carried out in Manchester have been attempted, and have signally failed. In fact, it is worthy of grave consideration, whether it is not entirely without the province of a municipal government to enter upon any trading business whatever. As a rule this is never done well, is very expensive, and is open to this grave objection, that, unlike a commercial firm or company, a municipality rarely ever knows what business so conducted by them really costs, and it is liable to abuse from favouritism and sinister influences of all kinds. The argument is very plausible that a corporation ought to have the control of water, as so much of it is wanted for public purposes; but we have to inquire whether the public service is likely to be better supplied by a corporation becoming also a water company, or in its public capacity contracting with an existing water company. All experience will, I think, support the latter view.

Be that as it may—if we have conceded the principle, how are we to apply it to London—where, with the exception of the City, we have nothing worthy of the name

of municipalities? No one will look at the Metropolitan Board as a permanent institution. From the manner in which it is elected it is virtually an irresponsible body; and neither by its constitution nor its antecedents would it be recognised as a power in whose hands might be safely deposited the administration of the water supply. We have thirty-nine vestries and district boards—too many to secure efficiency and responsibility in the execution of public works. That is our first and greatest difficulty in the discussion of all public questions affecting the local government of the metropolis. What we require to put us in a fair position is an extension of the Municipal Act to the metropolis. Make every parliamentary borough into a corporation, elected in the same way, and for the same purposes as corporations in such towns as Birmingham and Bristol, with a central body for purposes of general government. If this were done, then I believe that they could more profitably contract with the water companies for the water wanted for all public purposes, than enter upon the supply of water under any centralized management; and such bodies, elected by the ratepayers, who are all of them consumers of water, would also be able to protect the interests of all classes, by seeing that the arrangements entered into for an efficient water supply are properly and fully carried out. If this were done, then I think that an Act of the Legislature, making it compulsory upon the water companies to give a constant supply, and reasonable powers to enforce prevention of waste, would be the most effectual way to the desired end. We are not talking now of what would be best in an entirely new community, where no machinery for water supply existed, but what will be the best under present circumstances, where large interests have arisen, and where a complication of arrangements exists.

I have very imperfectly glanced at the main bearings of a great question, the settlement of which cannot be much longer postponed. Such suggestions as I have made I offer most deferentially to this assembly, and to those who may afterwards read this paper. I am aware that the subject is surrounded by difficulties. Immense interests are involved, but the greatest is that which is made up of the convenience, comfort, and health of a teeming and struggling population. We have no excuse for neglect, for it can be shown as clearly as figures can demonstrate anything—that, besides its other imperfections, the present system of water supply is both extravagant and costly. Happily, the question is one that is not likely to attract a host of noisy agitators, but it is therefore the more incumbent upon the thoughtful and the prudent, those who have the power to influence public opinion, that they should take it up and press it to a successful solution; and I am glad to find that all parties are disposed to consider it in a calm and conciliatory spirit. We live in an age fruitful of professions and promises—but we must not forget the admonition that "words are the daughters of Earth, and things are the sons of Heaven." Let us hope that the present opportunities will not be permitted to pass away unimproved. It is customary, in urging upon the community the importance of a water supply, to point to the works of the ancients—to their baths, aqueducts, and fountains. We have public works of other kinds which show that we have the ability to excel, both in design and execution, the boasted achievements of antiquity in all works of practical usefulness. We have the skill, the enterprise, the wealth—then why not employ it in this direction? In my judgment we can confer no greater boon upon the present age, nor lay any prouder claim to the gratitude of posterity, than by conveying to the houses of the poor and the toil-worn what Mr. Bateman appropriately designates as an inestimable blessing—an abundant supply of pure water.

DISCUSSION.

Mr. S. C. Homersham said for the last twenty years he had been obliged to give his attention, either in designing or constructing works or in attending Parliamentary committees, to the question of the water supply of London in the interests of the consumers. He was glad the paper before them had been brought forward in this public manner, because it would ensure the full and free discussion for which an opportunity was always afforded by this Society. This question had hitherto been too much treated by men in authority in private, without reference to the consumer, and too often by men who knew but little of the subject. He took exception to some of the statements put forward by Mr. Beggs. With regard to the question of constant supply, all who understood this subject would agree that constant supply was the right system, and there could be no doubt that sooner or later it would be adopted in the metropolis. But there were other matters connected with water supply which were even more important than this. Mr. Beggs had stated, with regard to the quality of the water, that "injustice had been done to the London companies by the condemnation of the water supplied by them," which, in some instances, had been analysed "after leaving a cistern, and assumed to be in the state in which it left the mains." He (Mr. Homersham) could only say that the bad quality of the water supplied by some companies had been evidenced by microscopic examinations by men of science, made for him (Mr. Homersham) on water taken direct from the mains, and by the death rates. He held in his hand the return of the Registrar-General, printed in the *Times* of 22nd August last, and, in remarking upon the mortality in the several districts of London during the prevalence of cholera, he wrote as follows:—

"We may now venture to look back and draw some deductions from the facts as they are recorded in the tables for the five weeks ending the 11th of August, during which 4,454 men, women, and children died of cholera and diarrhœa. The mortality in the five weeks has been at the rate of 37 per 1,000 living annually; but in both the South and West Districts, covered by 1,400,000 people, the mortality has scarcely exceeded the average by 1 per 1,000. . . . The dense Central Districts are, some of them, such as St. Luke's, remarkable for poverty; others, such as the City of London within the walls, for their wealth. The mortality by cholera was at the rate of 1 per 1,000 in St. Giles, 2 in the Strand, 0 in Holborn. . . . . There are seven districts in the East; the mortality by cholera in the poor district of Shoreditch was at the annual rate of 4, by cholera and diarrhœa 8 in 1,000; five of its sub-districts are supplied by the New River, one partially and one wholly by the East London, probably from Lea-bridge. In the rest of the East Districts the mortality by cholera was at very different rates: it was at the rate of 39 per 1,000 in Bethnal-green, 50 in Mile-end Old Town, 60 in St. George-in-the-East, 70 in Whitechapel, including deaths in the London Hospital from other eastern districts, 70 in Poplar and Bow, and 80 in Stepney. Bethnal-green is one of the poorest districts of London, if we may judge by the annual value of the houses; but the people of Bow and Poplar are not conspicuous for poverty. The whole of these districts, where the mortality from cholera was from 30 to 40 fold higher than it was either in the west or the central, in the north or the south of London, were supplied with water from the Old Ford reservoirs. London is divided into 37 districts: six districts are supplied from Old Ford, and everyone has been ravaged by the epidemic; the other 31 districts have for six weeks in succession suffered slightly. The 37 districts are subdivided into 135 sub-districts; 21 are supplied with the same water, and have all suffered six weeks in succession; 115 sub-districts have suffered inconsiderably, except in St. Botolph and a few other districts, where the same water has crept in, and the mortality is partially swollen. By the doctrine of chances it is impossible that the coincidence between this particular water and the high mortality should be fortuitous, in 135 cases, during six weeks in succession. The induction extends over all the area of observation in previous epidemics, where sewage water has so often led to cholera outbreaks. . . . . This great lesson should be taken to heart by every water company and every community in the kingdom. Unclean water cannot be consumed with impunity; its consumption is the sin of which cholera is the punishment."

That was only one of a dozen similar documents which had been issued during the last five or six years by men of the highest authority. Mr. Simon, the medical officer of the Board of Health, had stated in this room the prejudicial effects which were produced upon the population of one of the southern districts of London, from the supply to them of water taken from the Thames at Battersea, and it was notorious that in the districts supplied at that time by the company then referred to, cholera was

very prevalent on each occasion of the visitation of that disease. Whether the supply were constant or intermittent the quality of the water was pernicious. He spoke on this question from extensive experience, not only in London and its environs, but throughout the United Kingdom. With regard to the important question, in whose hands the administration of the water suppy should rest, there was the remarkable fact before them that, with one single exception, owing to the opposition of Parliament and the Government of the day, for the last sixty years there had been no new company allowed to be formed for the supply of water to London. Mr. Beggs had said, without giving any grounds for the statement, that it would not be desirable to form a new company, and that two sets of pipes ought not to be put down in the same streets. That was another point to which he took exception. He (Mr. Homersham) submitted that if they were to have an adequate and cheap supply of pure water in London, it was indispensable that they should have competing companies, and that new companies should be allowed by Parliament to be established. The aggregate capital raised by the existing water companies was between seven and eight millions, which had risen to an artificial value of between eleven and twelve millions. Before they could change the present administration otherwise than by competition they must buy up the interests of those companies, and it was proposed, when that was done, to throw them aside as useless, and carry out a large independent scheme. The proposition put forth by Mr. Bateman, who had supplied Glasgow with water from Loch Katrine, was that they should give the old companies an income in perpetuity of £450,000 a year, that being the present net revenue of those companies. He then suggested that they should go to the Severn, and impound the water in artificial lakes, for their supply, while Mr. Hemans proposed that they should go as far as the Cumberland lakes. He thought that of the many monstrous propositions that had been put before the ratepayers these were the most monstrous. Many of the water companies had been literally poisoning the people of London; and looking at the effects produced, he did not see why those companies should be freed from fair competition, and, instead of being compensated, should not be made liable to the legal penalties which were imposed upon railway companies or injuries and deaths occasioned by want of proper precaution in the conduct of their business. He would mention an instance within his own experience, to show the value of competition in water supply Some years since the inhabitants of Plumstead, Woolwich, and Charlton, became dissatisfied with the quality of the water supplied by the Kent Water Works Company, from the source of the Ravensbourne, and they determined upon having better water from the chalk formations in their own locality. A company was able to be formed for the purpose, without applying to Parliament, and in three or four years 90 per cent. of the consumers of the locality left the old company, simply from the superior quality of the water. The success which attended this measure induced the old company to resort to the expedient of sinking similar wells, in the hope of getting back their customers, the ultimate result being that, after a competition of several years that company abandoned the Ravensbourne altogether as a source of supply, bought up the interests of the new company, and thus the district was now supplied with water free from impure organic matter. That was a practical illustration of what competition had done in the matter of the supply of pure water. As to the present London water, no doubt that above Teddington lock was better than that below it, but, at the same time, he thought the supply obtained from the water-shed of the Thames was not satisfactory. In the Queen's Speech, on the opening of the present session of Parliament, he found the following paragraph:—"Estimating as of the highest importance an adequate supply of pure and wholesome water, I have directed the issue of a commission to inquire into the best means of permanently securing such a supply for the metropolis and for the principal towns in the densely populated districts of the kingdom," but when he turned to the instructions giving to the commission, as published in the *London Gazette* of 28th December, he found them to be as follows:—After reciting the names of the commissioners, the words were—"for the purpose of ascertaining what supply of unpolluted and wholesome water can be obtained by collecting and storing water in the high grounds of England and Wales, either by the aid of natural lakes or by artificial reservoirs, at a sufficient elevation for the supply of the large towns, and to report, firstly, which of such sources are best suited for the supply of the metropolis, and its suburbs, and secondly, how the supply from the remaining sources may be most beneficially distributed among the principal towns." Now in the speech from the throne they were told that the inquiry was to be into the *best* means of obtaining a permanent supply of pure water, whereas in these instructions they found it was to be obtained from natural or artificial reservoirs. What he would say on that point was that if they took the water from any lake, natural or artificial, that lake would represent the cesspool of a large district of the country around it. It might have the quality of softness, but it would be impure and contaminated with the droppings of animals, decaying vegetable matter, the *exuviæ* of fish, and living organisms, and was altogether unfit to be brought into this or any other city for domestic purposes.

Mr. Elt would mention one or two facts in connection with the supply of water from the chalk basin of London. About twenty years ago, Mr. Webb, a soda-water manufacturer, of Islington, in order to get a supply of water suitable for his purposes, sunk a well to the chalk and obtained excellent water from it. A few years subsequent to that a similar well was sunk in the same neighbourhood for the purposes of the Pentonville Model Prison, and immediately after that was done Mr. Webb found his supply so deficient that he was obliged to sink his well ten feet deeper to get the quantity of water he wanted. A few years after that the Holloway Prison was built, and there also a well was sunk into the chalk basin; the consequence was, the well of the Pentonville Prison had to be deepened, and Mr. Webb had also to sink his well another 20 feet to get the supply he had before. There was another case he could mention. At Nicholson's Distillery, in Clerkenwell, a well was sunk into the chalk, and water obtained from it. A brewer, occupying nearly opposite premises, also sunk a similar well, and each well had such an effect upon the supply of the other that a contest was maintained for a length of time, at a cost of several thousands of pounds, to obtain the supply of water which each party required, until at length the victory was gained only by the superior pecuniary resources of the distillery. In the latter case, the wells were sunk within a short distance of each other; but in the case of Mr. Webb and the two prisons, the wells were situated a mile and a-half or two miles from each other. The New River Company, wishing for a larger supply of water, sunk a shaft close to their reservoir in the Hampstead-road, and, after going a great depth, they could only obtain a supply of 4,000 gallons per day, and at times it was so small as to be insufficient to keep the pumps in working order; the attempt was abandoned after the expenditure of many thousands of pounds. With regard to the point that the present daily supply to the metropolis of 108,000,000 gallons was at the rate of 30 gallons per day for each head of the 3,000,000 of populatior, he might observe that that calculation was deceptive, because putting aside waste, evaporation, and other causes of loss, a very large proportion of that water was consumed for manufacturing purposes, and a further large quantity for the supply of ships in the port of London, and in the summer large demands were also made for road watering.

With respect to where the supply should be obtained, it was not for him to say, but it would seem that at present one-half the population of the metropolis must make up their minds to be poisoned, and the other half must bring actions against the water companies for doing it.

Mr. W. Botly remarked that a good deal of valuable information had been elicited at different times in discussions that had taken place in this room, on the subject of water supply, and there had recently appeared an able pamphlet by Mr. Bailey Denton on the subject, which had been noticed in the Society's *Journal*. He (Mr. Botly) agreed generally with the views expressed in the paper, and particularly with regard to the pollution of water in cisterns. Having had considerable experience in this matter in the town of Salisbury, he could state that great mortality occurred from cholera in the lower districts, where the water was bad, and for a long time the ordinary death rates were very high, but since the water supply had been taken from the chalk, the rate of mortality had greatly diminished, and the health of the town was at present all that could be desired. For his own part he should prefer to see the administration of the water supply in the hands of the vestries, rather than in those of corporations.

Dr. Bachhoffner gathered, from what had fallen from Mr. Beggs, that the great panacea with reference to the water supply was, that it should be constant; that appeared to be the pith of his paper. However desirable a constant supply might be, it would involve great expense in adapting the present water-service of the houses to such a system; but he believed that Mr. Beggs had an admirable contrivance of his own (though he had not mentioned it) in the shape of a water-meter, by which the consumer might use as much water as he liked, and pay for no more than he used. As to the obtaining a constant supply, the fact was, they had it already, for there was an Act of Parliament in existence which provided that if three-fourths of the consumers in any district agreed to demand a constant supply, the water company was bound to give it. It was, therefore, their own fault, and not that of the companies, if they had not a constant supply.

Mr. W. B. Galloway said this was a question of such vital importance to the highest interests of humanity that it ought to be discussed irrespective of all pecuniary considerations. As to the quantity supplied, he thought 30 gallons per day per head of population was liberal enough, if it were not for the enormous waste that took place in all large cities and towns. He conceived, however, that a larger supply would be beneficial to such a city as London, and that they ought to have the purest water that could be obtained for domestic use. He suggested a special supply, with a separate arrangement of pipes for that purpose, and that the water for washing, manufacturing, and sewerage purposes should be furnished through the present ordinary channels. Instead of going 200 miles away for water, he would utilise the natural ebb and flow of the Thames by means of reservoirs placed at such an elevation as would give sufficient pressure to be at once available in the extinction of fires, instead of having to wait for the arrival of the engines. He did not think there would be any necessity to break up the streets to provide the second set of pipes which he suggested, but he thought they might be placed above ground. They ought to value the public health above all commercial and pecuniary considerations; and such questions as these should be discussed on the principles of equity, and having regard to the highest interests of humanity.

Mr. Baldwin Latham thought there were some points in the paper which might lead to misconception on the subject of constant supply in respect of the places where that system already existed. It had been stated that in Norwich, under the constant supply system, the consumption had been reduced from 40 gallons per head per day to 12 or 15 gallons. At the period during which the consumption was 40 gallons per head, it proved to be a ruinous affair for the company; but when an engineer took the matter in hand, and adopted special fittings to prevent waste, and when the consumption was reduced from 40 gallons to 15, the company was brought from a state of insolvency into one of profit. It should, however, be stated that in Norwich, out of a total of 15,000 houses, only 3,000 were provided with water-closets; and at Wolverhampton and other places where there was a constant supply the consumption of water was at a comparatively low rate from the same circumstance. In the case of London, in the event of a constant water supply being afforded, it was to be presumed that each house would have its water-closet, and consequently a large amount would be required for such purposes. He might state that in the 120 towns where he had examined the water supply, the average supply was 25 gallons per head per diem, and where any great falling off in consumption was noticed, it was in those towns which did not possess an adequate system of drainage. With regard to the regulation of the supply by meter, it would on the face of it appear a fair proposition on the part of a company, provided they could in this way realise the fourpence per thousand feet from the consumer. But the quantity of water required by the lower classes was larger than that which was used by the upper classes, and, therefore, if the former were made to pay the same for their water as the latter, they would be compelled to economise their consumption, a most undesirable result. He thought, on the whole, the system of supplying water by rental was a fair and equitable one to all classes. As to the fittings required when a constant supply was given, he believed in the case of London that no difficulty would arise in this respect. They were not now discussing the sources of supply, but in most of the towns in the country where works had been carried out, extensive arrangements had been made for the storage of water; but here they had a large river like the Thames going through London, and thousands of acres along its banks were now under water, and that which would be valuable for storage was allowed to run away to waste. If that could be made available, a better supply might be secured, and the companies could give a constant supply at a not unreasonable cost. With regard to the internal fittings in houses, they found in most cases the water supply for domestic purposes was from cisterns, which also supplied the water-closets, and too often became contaminated with the foul gases there formed. He believed the only remedy for this was the separation of the water used in the closets from that which was employed for domestic purposes.

Admiral Sir F. Nicholson said, allusion had been to the Thames by two speakers. He had some acquaintance with that river, and with what was done with regard to purifying it; large powers had been granted, by the Act of last session, to enable those who had charge of the Thames to keep all sewage from entering it. The Metropolitan Board exercised "conservancy" in that respect over the portion extending from Putney to the Lower Reaches, where the sewage was carried out to sea; and it was hoped that in the present session similar powers would be conferred with regard to the portion between Putney and Staines; so that in a short time the whole of the sewage would be kept out of the Thames, as soon as the towns and villages on its banks were able to make such arrangements as would obviate the discharge of any sewage whatever into the stream.

The Chairman said that was to be in three years.

Admiral Sir F. Nicholson added, that whatever the period might be, if they kept the sewage out of the Thames, and prevented the enormous waste of water from the flooding of the land; and if they stored that water, they would be able to give a large additional supply to the metropolis without going to Wales or Cumberland for it.

Dr. Whitmore merely rose to answer an observation that fell from Mr. Homersham with regard to the sup-

posed impurities of the Thames water. It formed part of his professional duty, as a medical officer of health, to analyse the water supplied by two Thames companies, the West Middlesex and the Grand Junction, and he could say for the last twelve months the water supplied by those companies was in an exceedingly pure condition. On the average the West Middlesex Company did not contain more than half a grain of organic matter in a gallon; and that was also about the condition of the water of the Grand Junction Company. On the other hand, the water derived from the surface wells of the metropolis, and which the inhabitants of London had been accustomed to drink and to speak of as fresh, sparkling spring water, was most impure. In Marylebone there were as many as 25 or 30 of those wells which had been lately supplying the inhabitants with water for drinking, and he had always found from three to six grains of organic matter per gallon in that water. The condition of that water was such that, during the visitation of cholera, he thought it his duty to request the local authorities to close the pumps. Looking to the fact that a large number of towns on the Thames still discharged the sewage into the river, it was a remarkable thing that the companies' water was brought to them in such pure condition as it was; this was the result of the admirable system of filtration adopted. It was, therefore, an injustice to those companies to say they were still supplying the public with poisonous water. For his own part, he thought an intermittent supply was better than a constant one; for this reason, that if they had a constant supply it was necessarily allowed to come in very small quantities. They could draw, probably, from the present supply as much in one minute as they would be able to draw in half-an-hour with a constant supply. Moreover, the change of system would involve the alteration of the whole of the fittings in a house, as the present taps would be blown off by the high pressure required. It would, therefore, involve considerable expense to every householder. With regard to the amount to be supplied, the limit had been fixed at 12 to 15 gallons per head per day, but that was making but small allowance for the discharge of water down the drains and closets, which tended to remove fever and other epidemics from our dwellings. There was no cause for apprehension as to the failure of the present sources of supply. Taking the case of the Thames for the last two or three years, there had been flowing over Teddington Lock an average of 500,000,000 gallons of water in the 24 hours, while we were only taking about 80,000,000 gallons daily above that lock.

Mr. Cooper, as a medical officer of a poor district of the metropolis, was in favour of a constant water supply. The more water they had the better it was for the population in all respects. With regard to the high pressure spoken of in connection with the constant supply system, he apprehended it could be so regulated as to be deprived of all danger even in conveying the water to the top stories of the houses, a system which, in the case of houses let in lodgings, he particularly desired to see carried out, as greatly conducing to habits of cleanliness.

The Chairman said it had seldom been his lot to hear a more able paper on any subject than that which had been brought before them this evening. Some of the positions were irrefragable, and others were sustained by able arguments, though he could not say he agreed with all of them. It was a wonderful fact that for nearly a quarter of a century the insufficiency of the water supply had been fully acknowledged, and yet not fully remedied. It was almost impossible in this country to get anything done unless the people themselves put their shoulders to the wheel and forced it upon the legislature. The House of Commons invariably waited for the expression of the opinion of the people; it did not attempt to go before them, still less did it attempt to impose the weight of its influence upon them. It therefore remained with the people to force this question of water supply upon the attention of the legislature. We had had severe lessons of late as to the necessity for an adequate water supply in the metropolis, in the recent visitations of cholera, typhus, diarrhœa, and other malignant forms of disease, the results of which were more deadly to the population than the battle-field was to those engaged in a campaign. Mr. Beggs, he thought, seemed rather to slight the amount of the death-rate which proceeded from an insufficient supply of water: he argued that it resulted from various causes. Doubtless it did, bad air was unhealthy, and bad food was unhealthy; but still he believed, of all causes of sickness, that which proceeded from an insufficient supply or bad quality of water was the worst. In that respect he agreed with Mr. Homersham. It was proved by the returns of the Registrar-General in the visitation of cholera last year that wherever the polluted water from the Old Ford went, there cholera went with it. At North Shields, in a part of the town where polluted water was supplied, there cholera appeared; in other parts of the same town where the water was of good quality it was unknown. Did not that prove that cholera and diarrhœa went with bad water? Mr. Beggs had alluded to the question as affecting the poor. That, he thought, was a most important subject. If, from the circumstances by which they were surrounded, they were accustomed to uncleanly habits, they gradually deteriorated in their moral condition, and sank in the scale of humanity, should we not exert ourselves by all possible means to prevent such a result as that? To take a low view of the case. Let them consider the amount of sickness that was thus generated, by which the poor rates were increased, and so the rich were made to pay. He could not agree with Mr. Beggs that the rich should not in these matters pay for the poor, but that all classes should pay equally. The Legislature, in a matter not so important—that of the income-tax—agreed to the principle that the rich should pay, and that the poor should escape; and why should not this be applied in the case under consideration? One speaker had referred to the bad effects of water entering the cistern from the roofs of the houses. No doubt such water became largely impregnated with poisonous gases, which it absorbed from the impure atmosphere of towns. The subject of constant water supply to the metropolis had been urged on the Legislature since the year 1850, not only by theorists, but by the irresistible logic of facts. In the matter of the preservation of property from fire, the question of constant supply was one of great importance. This has been especially evidenced at Wolverhampton and Paisley, where it appeared that there was always a supply of water at high pressure, rendering it almost impossible that serious fires should take place. When they took into consideration the fact that the average time for a fire-engine to arrive at the scene of a fire was half an hour, and that in the towns he referred to premises when on fire had been flooded with water in five minutes, the great importance of a constant supply in London, with all its vast amount of property, would be at once apparent. As to the sufficiency of the present supply, it must be borne in mind that what was sufficient some years ago was not sufficient now. The increase of population was considerable, and gradually cleanly habits had increased, so that persons who used little water formerly, required now a larger supply. Thus the water supply of all towns became more and more insufficient. Glasgow in 1838, was supplied with 26 gallons per head per day; in 1845, it rose to 30 gallons, and that was insufficient; in 1852, it was increased to 38 gallons, and at the present time 45 gallons per head was complained of as insufficient. With regard to the purity of the water he ventured to differ from the medical gentleman who had spoken on that subject, though, as he was an authority in the matter, he would not press his opinion. With regard to the rates charged for water, he considered the water companies placed them too high, particularly when it was considered, as Mr. Beggs stated, that they were

only water-carriers. The gross annual receipts of the several water companies in London amounted to £700,000, and they paid in dividends £400,000 a year. The rateable value of the metropolis being fifteen millions, that income represented one shilling in the pound. That was surely too much to pay for water supply. Mr. Bateman proposed to bring the water from the Plinlimmon hills, free from all impurities, and deliver it at the houses at three pence in the £ only. Mr. Homersham rather found fault with Mr. Bateman's proposition to buy up the old water companies and pay them the £400,000 which they now received in dividends; but that sum would include the purchase of such mains and works as would be required under the new system which Mr. Bateman proposed. He (the Chairman) was sure it would be the unanimous feeling of the meeting that their best thanks were due to Mr. Beggs for the exceedingly able paper he had brought before them.

The vote of thanks having been passed.

Mr. Beggs having expressed his gratification at the cordial manner in which the proposition had been received, said he had one other acknowledgment to make, and that was to Dr. Bachhoffner, for the way in which he had advertised a portion of his business; the kindness was all the greater because it was unsolicited. He would, however, correct Dr. Bachhoffner's impression that he (Mr. Beggs) was the inventor of a water meter; he was only the seller. On the other hand, he had said nothing about the application of meters to domestic water service; and he believed no inventor had found one which was so applicable; therefore, as they were only suitable for large manufacturing establishments, he thought, if he had entertained any considerations of a commercial nature, he had not advanced them in any way in the paper he had had the pleasure of bringing before them.

Proceedings of Institutions.

Bacup Mechanics' Institution.—The report presented at the twenty-eighth annual *soiree*, held on Wednesday, January 2nd, says that the various departments of the Institution have been maintained in a high state of efficiency. The number of members for the separate quarters has varied as follows:—1st, 304; 2nd, 265; 3rd, 160; 4th, 373; the average number for the whole year being rather less than for the preceding year, which was the highest on the records of the Institution. Two hundred and twenty volumes have been added to the library during the year, and 4,410 volumes issued. The directors express their acknowledgments to David Morris, Esq., of Manchester, who kindly gave his services for an evening's entertainment for the benefit of the library fund, and also a handsome donation for the same purpose. In consequence of direct telegraphic communication between Manchester and Bacup having been recently completed, arrangements have been made for the daily supply of two reports of the Liverpool Cotton Market, and also for reports of the Liverpool and Wakefield Corn Markets. The attendance at the classes, both male and female, has been most gratifying, the scholars averaging 95 per night, and in the various examinations the students have taken a fair proportien of prizes and certificates. The day school register now shows a larger attendance of scholars than for several years past, the average being 165. The treasurer's account shows that the receipts have been £524 11s. 1d., and that there is a small balance in hand.

TAXATION OF INSTITUTIONS.

It appears from the *Birmingham Daily Gazette* that a deputation, consisting of the Mayor of Birmingham (Mr. G. Dixon), Aldermen Hawkes and Ryland, of Birmingham; Mr. Councillor Price and the Borough Treasurer of Leeds, had an interview with the Chancellor of the Exchequer, a few days since, on the subject of the assessment of public buildings to the inhabited house duty.

The deputation was introduced by Mr. Scholefield, M.P., who stated that, in consequence of the shortness of the notice, deputations from several other towns were unable to attend.

The Mayor stated that the object of the deputation was to obtain relief from the taxation of public buildings to the inhabited house duty.

Aldermen Hawkes and Ryland pointed out that till within the last two years the Town Hall, the Midland Institute, and other public buildings in Birmingham were not assessed to the inhabited house duty. At that time the Free Library was not built, but at the present time the Town Hall was assessed at a rental of £1,500 a-year, and the Midland Institute at £1,000, so that in the case of the Town Hall the tax, added to the curator's salary, far exceeded the whole sum received for the use of the hall. The authorities at Birmingham had appealed against the tax, but the Board of Inland Revenue had decided against them, on the authority of a case decided by two of the judges in reference to Wolverhampton some years ago, which decision seemed to provide that if a building was used as a residence for any person it was liable to the house tax. The deputation urged that Parliament could never have intended that a building like the Town Hall, in which only two or three rooms were occupied by a person in charge of the same, should be liable to the duty, and asked the Chancellor if he would introduce a short Bill to exempt such buildings in future. If this were done, the deputation said they should still continue to allow the curator to reside on the premises, but if that request were not acceded to they were prepared to take a house in the neighbourhood, and thus claim exemption. Another alternative suggested by the deputation was that only that part of the building used for residence should be taxed.

The Chancellor of the Exchequer appeared to assent to the reasonableness of the request of the deputation, and requested that the suggestions should be put in the shape of a memorial to the Lords of the Treasury so that he might bring the matter formally before the Government.

The members of the deputation are anxious, as far as possible, to enlist the co-operation of the managers of Institutions in all parts of the country in obtaining the desired exemption.

Manufactures.

Prizes of £800 for Machines for cutting Coal.—It appears by the *Mining Journal* that with a view to encourage the development of coal-cutting by machinery, the Association of the Colliery Proprietors of South Lancashire and Cheshire have decided to offer three prizes to the inventors of the best machines for the purpose. The machines submitted for competition are to be supplied not later than Nov. 1, and they will then be practically tested in the collieries before a committee appointed by the association for that purpose. The committee will by this means ascertain which machines are most suitable to the requirements of the trade, and prizes of £500, £200, and £100 respectively will be awarded to the three best. That the existence of a practically useful machine will place the coal-owners in such a position that they will be less at the mercy of their workmen is beyond question; but it does not by any means follow that the introduction of machinery will be injurious to the workman, unless he himself makes it so. The value of such a certificate as the winning of even the lowest of the three prizes would be, as to the merit of a machine, beyond estimation, the association being composed exclusively of gentlemen whose reputation for integrity and honour is universal, and whose practical knowledge

is acquired from their habitual occupation being the actual management of the collieries in which they are interested.

Colonies.

Australia Exporting Wool to America. — The *Melbourne Argus* says an experiment of an interesting nature is about to be tried with one of the staple exports of this colony. Hitherto all the wool exported from Australia has been sent to London or Liverpool, almost exclusively to the former port. It appears, however, that American buyers are not unfrequent at the London sales, and to test the United States market a fine ship has been placed on the berth for New York direct, carrying wool. The result will be looked forward to with considerable interest. It is very rarely that a vessel sails from this port direct to any of the cities of the east coast of America. This is only the second ship which we can call to mind as having been placed on the New York line during some years past. If it finds a good market a new trade may be opened up.

Bootmaking in Australia.—It appears by a Melbourne paper that the manufacture of boots and shoes on an extensive scale has only recently commenced in the colony, but the strides have been very rapid, and establishments are at present in operation which do business wholesale. At the Intercolonial Exhibition the Collingwood Boot Factory shows a case of boots, all of which were closed and footed by apprentices who have served about 2½ years of their indentures; and all the leather used was tanned at their factory, which is situated in Collingwood Flat. It is, in fact, a tannery and boot factory combined. The hides are received, tanned, and curried to the extent of two or three hundred weekly, the greater portion of which is worked up into boots and shoes. The soles are pegged and not stitched, and the system of division of labour is thoroughly carried out. The number of men and boys on the establishment, engaged in tanning, &c., and making boots and shoes, is about 200, and a vast amount of work is annually turned out, which is distributed throughout the colonies.

Notes.

Southern Counties Association. — The monthly meeting of the Council was held at the Society of Arts on Tuesday, February 12th., Viscount Eversley in the chair. There were present Mr. Benyon, M.P., Mr. W. B. Simonds, M.P., the Hon. and Rev. S. Best, Colonel Lennard, Rev. J. Goring, Mr. Lyall, Colonel Deedes, Rev. J. S. Clutterbuck, Mr. Clutton, Mr. Rigden, Mr. Turner, Mr. Punnett, Rev. J. Beck, and Mr. Shute (Secretary). Reports were presented by Mr. Rigden from the Agricultural, and by the Hon. and Rev. S. Best from the Arts Department. Both committees were empowered to carry out their recommendations. The offer of the Pavilion for the Loan and Arts Exhibition was accepted, as well as that of the Sussex Horticultural Society to hold their flower show at the same time, and in connection with the exhibition. The Council was adjourned to March 12th.

Dwellings for the Working Classes.—A deputation from the Metropolitan Building Society waited on the Earl of Derby on Saturday, the 9th inst., with the object of obtaining a loan of £500,000 for the building of extensive ranges of workmen's houses in the metropolis. The prospectus of the company, which had been previously sent to Lord Derby, states that the want of workmen's houses was so great and pressing that it would require at least £500,000 per annum to be expended for the next five years to mitigate the evil in any sensible degree. That outlay would supply house accommodation for 100,000 persons. Mr. A. Alison, the chairman of the company, explained the object of the deputation. The society which the deputation represented asked the Government to guarantee their debentures bearing 4 per cent. interest for seven years, to the extent of three-fourths of the expense of the buildings, in security of which they would give a mortgage on the property. Lord Derby called the attention of the deputation to the Workmen's Houses Act of May, 1866, under which any company might obtain loans, to the extent of one-half the cost of the buildings, at 4 per cent. interest. Mr. Alison stated that that act was passed when the interest of money was 10 per cent., and then it offered great inducements to the public to act upon it by obtaining money at 4 per cent.; but now it offered no inducements, as the interest of money is 3 per cent., and loans to the extent of one-half could now readily be obtained from private sources. He (Mr. Alison) thought the plan he had suggested of issuing debentures with the Government guarantee was much better for the Government, as it would involve them in no outlay of money. Lord Derby said that although the act of last year had not yet been acted on, he fully expected that it would. Should, however, the act remain inoperative, the question of amending it might then be considered; in the meantime he was not prepared to advise Parliament on the subject.

Correspondence.

Cab Fares.—Sir,—Within the last ten years I have employed thousands of cabs. I never ask a cabman what his fare is, and I never have any disputes on paying them—because I find the following method an almost infallible criterion of the distance I travel. A "four-wheeler," as a rule, goes about eight miles an hour, and a "hansom" almost exactly nine miles an hour. In other words, a "four-wheeler" goes a mile in 7½ minutes, and a "hansom" goes a mile in 6¾ minutes. I give the cabman the benefit of the fractions, and pay a "four-wheeler" sixpence for every seven minutes he drives me, and a "hansom" sixpence for every six minutes he drives me; I thus pay the "four-wheeler" about sixpence halfpenny a mile, and the "hansom" about sevenpence a mile, and the payment is almost always received with thankfulness. From long experience I know the distance to most parts of London; but if I go any new route my method of calculating the distance always stands me in good stead. It appears to me that if strangers, or those unused to London distances, adopted this method no cab extortion could take place. To simplify matters, both styles of cabs might be paid at the same rate, viz., one penny for each minute travelled. Thus, for a journey occupying twelve minutes, the fare is one shilling; if the time occupied be any time between twelve and eighteen minutes the fare is one shilling and sixpence. By this method the cabman (unless he be a "hansom" going express, as to catch a train) is always liberally paid.—George Wyld, M.D.

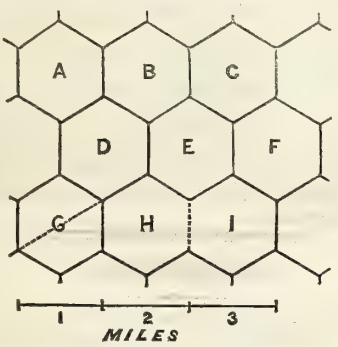
15th February 1867.

The Cab Question.—Sir,—Not having taken part in the late discussion on cab fares, I could not say a word about cab-strings. To the great inconvenience of their fares, cabmen have generally given up holding the check-string, and some have no check-string at all. I can see no regulations as to check-strings in the police book, but I remember hearing from an old stager, many years ago, that a cabman who did not hold a check-string forfeited his fare.—I am, &c., Hyde Clarke.

32, St. George's-square, S.W.

The "Course" System applied to London Cabs. —Sir,—If the "course" system is to be adopted for London cabs, in justice to the drivers it would hardly be fair to map the metropolis in miles square, for by that means it would be possible, taking the spaces diagonally, to deprive the driver of thirty per cent., and certain districts would be less favoured, as lying upon the horizontal and perpendicular lines. The inter-commu-

nication between north and south, and east and west, might be greatly retarded, whilst the north-west and south-east, and south-west and north-east would in that case be advanced, that is if the lines were drawn from the four points of the compass. To equalise this I would honey-comb the map, giving lines alike in favour of all districts. By this plan the driver might, once perhaps in fifty times, be enabled to charge a "course" for three-fourths of the first mile, and even, perhaps, as often to get three "courses" within a one-mile drive, but these occasions would fall within the fair law of chances, and favour no point of the compass; and, as a compensation, the intersecting points would give the overplus to the rider. I enclose a plan. The dotted line in G shows



where the mile would be slightly elongated in favour of the rider; between H and I, I have marked where the cab-driver would gain; the balance of favour (under a mile) is with the cabman, which, with the present fares, is upon the right side.—I am, &c., John Leighton.

MEETINGS FOR THE ENSUING WEEK.

Mon.....R. Geographical, 8½. 1. Mr. W. Chandless, "Explorations of the Purus and Aquiry in the Amazon's Basin." 2. Don Antonio Raimondy, "On the Rivers of Caravaya, South Peru."
British Architects, 8.
Actuaries, 7. Mr. Samuel Brown, "On the Mortality in the United States of America, as deduced from the last Census."
R. United Service Inst., 8½. Mr. James Reddie, "On Manning the Navy."

Tues ...Medical and Chirurgical, 8½.
Civil Engineers, 8. 1. "Description of the Clifton Suspension Bridge;" and, time permitting (2), Captain H. W. Tyler, "On the Working of Steep Gradients and Sharp Curves on Railways."
Ethnological, 8. 1. Mr. H. H. Howorth, "On the Archæology of Bronze, in connection with Ethnology." 2. Hon. Geo. Campbell, "On the Non-Hindu Tribes of the Borders of Hindustan."
Royal Inst., 3. Prof. Tyndall, "On Vibratory Motion and Sound."

Wed ...Society of Arts, 8. Mr. Edwin Chadwick, C.B., "On the Economy of Telegraphy as part of a Public System of Postal Communication."
Archæological Assoc., 8½.

Thur ...Royal, 8½.
Antiquaries, 8½.
Royal Inst., 3. Prof. Tyndall, "On Vibratory Motion and Sound."
London Inst., 7. Prof. Wanklyn, "On the Chemistry of the Noble Metals."
Zoological, 8½.
Philosophical Club, 6.
Mathematical, 8.

Fri .....Royal Inst., 8. Capt. V. D. Majendie, "On Breech-loading Small Arms."

Sat .....R. Inst., 3. Mr. G. A. Macfarren, "On Harmony."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 12th October, 1866.

428. East India Communications—Report and Evidence.

Delivered on 19th October, 1866.

140. (I.) Great Yarmouth Election—Index to Minutes of Evidence.
210. (I.) Lancaster Borough Election—Index to Minutes of Evidence.
422. (A. IV.) Poor Rates and Pauperism—Return (A).
477. Bermuda (Yellow Fever)—Return.
525. Vessels not Armour-plated—Return.
526. Iron-plated Ships and Batteries—Return.
528. Cattle, &c. (Live Stock)—Return.

Delivered on 26th October, 1866.

64. (II.) Sheriff Courts (Scotland)—Second Supplementary Return, 1862 and 1863.
429. Joint Stock Companies—Return.
452. Metropolitan Local Government, &c.—2nd Report and Evidence.
529. Bombay Sanitary Commission—Report.

Delivered on 27th October, 1866.

458. Health of the Navy—Statistical Report.

Delivered on 30th October, 1866.

68. (IX.) Trade and Navigation Accounts (30th September, 1866).
308. (I.) Royal Hibernian Military School—Supplementary Return.

Delivered on 2nd November, 1866.

475. Public Accounts—Report.

Delivered on 9th November, 1866.

427. (I.) Trade in Animals—Index to Report.
462. East India (Accounts)—Return (Mr. Forster's Report).
471. East India (Telegraphic Department)—Return.
515. Medical Officers (Army and Navy)—Return (Report and Evidence, and War Office and Admiralty Letters, &c.).

Delivered on 12th November, 1866.

452. Metropolitan Local Government, &c.—Second Report, &c., corrected pages.

Delivered on 16th November, 1866.

442. Mortality of Troops (China)—Report and Evidence.
422. (A. V.) Poor Rates and Pauperism—Return (A).
495. Poor Law Union (Valuation Lists)—Return.

Delivered on 22nd November, 1866.

486. Gas Companies—Return.

Delivered on 1st December, 1866.

68. (X.) Trade and Navigation Accounts (31st October, 1866).
201. (I.) Maidstone Election—Index.
211. (I.) Rye Election—Index.

Delivered on 12th December, 1866.

Colonial Possessions—Part II. North American Colonies; African Settlements and St. Helena; Australian Colonies and New Zealand; Eastern Colonies; and the Mediterranean Possessions, &c.

Delivered on 13th December, 1866.

New Zealand—Further Papers (August, 1866).

Delivered on 14th December, 1866.

255. (I.) Hereford City Election—Index to Minutes of Evidence.
428. (I.) East India Communications—Index to Report of Select Committee.
504. Jamaica—Correspondence on the conduct of Naval Officers.
519. Sick Cases (Metropolitan Districts)—Return.

Delivered on 18th December, 1866.

483. Railways—Returns.
522. Births (Metropolitan Workhouses)—Return.

Session, 1865.

442. (E.) Poor Rates and Pauperism—Return (E).

Delivered on 22nd December, 1866.

251. (I.) East India (Military Finance, &c.), Part II.
Trade and Navigation—Annual Statement (1865).

Delivered on 24th December, 1866.

333. (I.) Cheltenham Election—Index to Minutes.
384. Woods, Forests, and Land Revenues—Forty-fourth Report, &c.
442. (A. VI.) Poor Rates and Pauperism—Return (A).

Delivered on 29th December, 1866.

Crops—Returns relating to Acreage, &c.

Delivered on 1st January, 1867.

68. (XI.) Trade and Navigation Accounts (30th November, 1866).
335. County Electoral Statistics, and Occupiers and Owners of Property in Counties—Returns, corrected copy.
442. (B.) Poor Rates and Pauperism—Return (B.).

Delivered on 9th January, 1867.

247. (I.) Bridgwater Election—Index to Minutes.
452. (I.) Metropolitan Local Government—Index to Second Report.
476. Colonial Bishoprics—Return.
491. Newspapers—Return.

Delivered on 30th January, 1867.

223. (I.) Northallerton Election—Index to Minutes.
243. (I.) Huddersfield Election—Index to Minutes.
274. (I.) Galway Town Election—Index to Minutes.
442. (A. VII.) Poor Rates and Pauperism—Return (A).
494. Electoral Returns (1866)—Return in continuation of the General Returns.

Delivered on 6th February, 1867.

Inland Revenue—Tenth Report of Commissioners.
Electoral Returns—Summary: Counties, England and Wales.

Session 1866.

442. (I.) Mortality of Troops (China)—Index to Report.
523. Strand Union—Letter.
532. Local Government Act (1858)—Eighth Annual Report.
The Queen's Speech.

Delivered on 7th February, 1867.

SESSION 1866.

474. Workhouses (Metropolitan Districts)—Statement.

Delivered on 8th February, 1867.

1. Bills—Finsbury Estate.
3. ,, Joint Stock Companies (Voting Papers).

Coal—Reports by Her Majesty's Secretaries of Embassy and Legation.
Manufactures, Commerce, &c.—Reports by Her Majesty's Secretaries of Embassy and Legation (No. 1).
Madagascar—Treaty of Peace, &c.
Japan (No. 1)—Correspondence.
The Danube—Public Act relating to the Navigation.
Moldavia and Wallachia—Papers.

SESSION 1866.

505. Boats (Dockyards)—Return.
516. Workhouses (Metropolis)—Returns.

Delivered on 9th February, 1867.

2. Bills—Annuity Tax Abolition (Edinburgh, Parish of Canongate).
6. ,, Transubstantiation, &c., Declaration Abolition.
7. ,, Offices and Oaths.

SESSION 1866.

521. Whitechapel Union—Correspondence.

Delivered on 11th February, 1867.

8. Railway Bills, &c.—Report.
17. Medical Relief, Dispensaries (Ireland)—Report of John Lambert, Esq.
19. General Committee of Elections—Mr. Speaker's Warrant.

Colombia—Treaty of Friendship, Commerce, and Navigation.
Army (Recruiting)—Report of Commissioners.
Private Bills—Statement of Proceedings.

Delivered on 12th February, 1867.

5. Bills—Shipping Local Dues.
9. ,, Metropolitan Poor.
11. ,, Libel.
15. Highland Schools (Scotland)—Return.

Poor Relief (Scotland)—Twenty-first Annual Report.

SESSION 1866.

411. Local Taxation Returns—Return.
433. Pilotage—Abstract of Returns.
508. Taxes—Return.

Lords' Address.

Delivered on 13th February, 1867.

2. Companies—Return.
20. Charitable Funds—Return.

Crete—Correspondence respecting the Disturbances.
British North American Provinces—Correspondence respecting the proposed Union.

Delivered on 14th February, 1867.

4. Bills—Railway Companies Arrangements.
8. ,, Criminal Law.
10. ,, Dublin University Professorships.
16. ,, Tests Abolition (Oxford).
17. ,, Industrial Schools (Ireland).
19. ,, Land Tenure (Ireland).
9. Post Office—Contract.
10. Small Arms—Account.
14. Police (Counties and Boroughs)—Reports.
16. Mint—Account.

British Shipping—Correspondence respecting the Operation of French Navigation Laws.
The *Tornado*—Correspondence.

SESSION 1865.

486. East India (European Forces)—Return.

Delivered on 15th February, 1867.

13. Bills—Church Rates Abolition.
14. ,, Artizans and Labourers' Dwellings.
18. ,, Trades' Unions.
3. Mails (West Indies)—Return.
40. Civil Services—Supplementary Estimate (Class IV., Vote 12).
41. Civil Services—Supplementary Estimate (Class VII., Vote 16).
42. Civil Services—Supplementary Estimate.

Patents.

From Commissioners of Patents' Journal, February 15th.

GRANTS OF PROVISIONAL PROTECTION.

Burglar-proof safes—176—J. Pinney.
Cards, distributing—239—W. W. Pocock.
Casks, &c., metallic hoops for—223—J. Poole.
Casks, taking off liquids from—3440—T. W. Plum.
Chlorine—134—W. Weldon.
Coverings for protection from weather—132—C. B. Marsden.
Crinoline skirts—168—C. Coleman.
Double-hooked fish-hooks—150—W. E. Gedge.
Driving belts—3426—W. Wilby.
Fermented liquors, fining—130—D. W. Hamper.
Fibrous materials, roving—219—G. Haseltine.
Fire-arms—3442—A. Henry.
Fire-arms—182—J. H. Johnson.
Fire places—3170—H. A. Dufrené.
Gas—164—J. Patison.
Gas—231—J. Greenshields.
Grain, separating—142—A. B. Childs.
Hides, &c., tanning—148—G. L. Loversidge.
Hops, pocketing, &c.—57—R. Winder.
Horse-shoe cushions—154—J. Edwards.
Horse-shoes, substitutes for roughing—225—C. D. Abel.
Hydrocarbon liquids, treating—64—L. Hand.
Iron channels, &c.—205—S. Carey.
Iron upon iron, &c., welding—128—B. Lietar.
Lenses—174—T. Ross.
Liquid matters, raising—2675—T. Woodward.
Locomotive engines—146—E. Slaughter.
Matches—126—A. Berens.
Metallic bolts—221—E. H. Waldenstrom and I. G. Bass.
Metal pipes—209—M. H. Lishman and E. Chambers.
Mines, saving life in—40—C. J. Pownall.
Mines, ventilating—235—J. Hopkinson.
Motive power—42—J. V. y Jové.
Paraffin, hardening, &c.—152—J. Rowley.
Portable steam engines—162—W. Exall.
Railway signals—29—C. I'Anson and A. Kitching.
Railway signals—140—J. Grant and J. Herbert.
Residual matters, treating—211—J. J. Lundy.
Ships—178—F. Palmer.
Ships' anchors—157—T. M. Gladstone.
Ships, &c., defence of—193—T. Berney.
Skins, treating—172—H. A. Bonneville.
Smoke, consuming, &c.—158—W. A. Martin.
Snow, &c., removing—92—C. J. Pownall.
Soap—241—C. E. Brooman.
Sound from lecturers to the audience, conveying—160—F. C. Rein.
Stations and railway trains in motion, and passengers, guards, and engine-driver, communication between—3201—H. F. Swears.
Steam boilers—3404—T. and T. F. Walker.
Steam boilers—166—W. E. Newton.
Steam boilers—243—W. E. Newton.
Steam generators—138—A. V. Newton.
Tablets, &c.—160—G. Mansell.
Type, distributing—3396—A. Mackie.
Umbrellas—136—J. Robertson.
Velvets, looms for making—215—E. Bellard.
Volute springs—217—G. Haseltine.
Watch cases—144—T. W. Willin.
Water wells—233—A. Donnet.
Wearing apparel—3324—G. Speight.
Weaving, looms for—170—S. and G. Cook.
Weaving, looms for—237—P. Jack, jun., and A. Coulthurst.
Yarns, winding, &c.—245—H. Craven and J. Speeding.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Bench vices—341—J. S. Hoar.
Heavy bodies, raising, &c.—389—E. H. Bernier.
Rain-water, collecting and storing—359—A. Ormsby.
Raw hides, preparing—394—W. H. Towers.
Ships, propelling—362—J. H. Johnson.

PATENTS SEALED.

2091. E.W.de Rusett & R. F.Dale.	2190. G. T. Bousfield.
2115. A. Paraf.	2214. G. H. Bovill.
2128. S. Mortimer.	2313. J. Silvester.
2129. J. S. Blockey & J. Hervey.	2647. W. Clark.
2140. J. Murphy.	2811. L. Daggett.
2141. H. B. Wright.	2868. P. Kerr.
2152. H. R. Minns.	2951. G. Perry.
2176. H. Wren and J. Hopkinson.	2974. J. P. Brown.
2168. W. Welch.	

From Commissioners of Patents' Journal, February 19th.

PATENTS SEALED.

2133. W. Weldon.	2183. J. G. Jennings.
2143. J. C. R. Isherwood and R. Warry.	2199. C. T. Porter.
	2217. R. H. Hudson.
2147. J. S. Nibbs.	2219. J. H. Johnson.
2149. J. Longbottom.	2229. J. G. Tongue.
2155. W. Tongue.	2303. A. Mackie.
2156. G. Haseltine.	2327. W. J. Curtis.
2157. G. Carter.	2425. W. Clark.
2159. S. A. Main.	2608. W. Dudgeon.
2160. J. Livesey and J. Edwards.	2676. R. Napier.
2163. W. Harrison.	3315. G. Nimmo.
2174. J. B. Fell.	3329. A. V. Newton.
2179. P. A. de Berenger.	

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

369. J. Henderson, S. C. Child, and W. L. Duncan.	420. R.C., R. J., & J. E.Ransome.
	538. E. Hall.
389. G. Bohn.	407. H. A. Jowett.
399. F. C. P. Hoffman.	398. W. Clark.
413. R. Hornsby, J. Bonnall, and W. Astbury.	433. T. Jackson.
	439. E. E. Allen.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

386. J. Green.	419. J. G. Jennings.
399. W. Leatham.	420. E. Caplen.
406. M. J. Haines.	

Journal of the Society of Arts.

FRIDAY, MARCH 1, 1867.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'Clock :—

March 6.—The following subject for Discussion will be introduced by Mr. Christopher Cooke :—"On Storm Signals and Forecasts, their utility and public importance with respect to Navigation and Commerce."

March 13.—"On the Tinnevelly Pearl Fisheries." By Clements R. Markham, Esq.

March 20.—"On Successful Oyster Culture." By Harry Lobb, Esq.

Cantor Lectures.

Owing to a severe domestic affliction, Mr. Chaffers was prevented from giving his concluding lecture on Monday last. Arrangements will, if possible, be made for its delivery later in the Session.

A Course of Lectures "On Music and Musical Instruments," by John Hullah, Esq., will be delivered as follows :—

Lecture I.—Monday, March 4.

Harmony.—Introduction—Greek Music—Mediæval Musical Science—Acoustics—Musical Sound—Vibration—Pitch—Harmonies—Resultant Sounds—Consonance and Dissonance—Tonality.

Lecture II.—Monday, March 11.

Melody.—Musical System—Tonality, Ancient and Modern—The Subdominant and Leading Note—Melodies in Imperfect Scales and in Ancient Modes.

Lecture III.—Monday, March 18.

Musical Expression. — Definition — Difficulties of Musical Composition—Realization of Unheard Effects—The Perfect Cadence—The Renaissance—Imitation—Expression, False and True.

Lecture IV.—Monday, March 25.

Musical Notation.—Different Systems, Alphabetical and Special—Neumas—Accents—Lines and Spaces—The Time Table—Modern Notation; its Origin and Growth, Simplicity and Fitness.

Lecture V.—Monday, April 1.

Musical Instruments.—Classification—Wind Instruments—Stringed Instruments—The Plectrum, Hammer, and Bow—Instruments of the Ancients—Mediæval Instruments; their Introduction into the Church.

Lecture VI.—Monday, April 8.

Musical Instruments (*continued*).—Modern Instruments—Chamber and Orchestral—Combination—The Modern Orchestra—Conclusion.

The lectures commence each evening at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend to each lecture. Tickets for this purpose are forwarded with the present number of the *Journal*.

Examinations, 1867.

In addition to the prizes announced in the Programme of Examinations, the following are offered :—

The Worshipful Company of Coach and Coach Harness Makers offer a prize of £3 in Freehand Drawing, and a prize of £2 in Practical Mechanics, to the candidates who, being employed in the coachmaking trade, obtain the highest number of marks, with a certificate, in those subjects respectively.

The Worshipful Company of Goldsmiths offer three prizes—of £5, £3, and £2 respectively—to the three candidates who, being employed on works in the precious metals in any part of the United Kingdom, shall obtain from the examiners the first, second, and next highest number of marks, such prizes to be distinguished as the "Goldsmiths' Company's Prizes."

Subscriptions.

The Christmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Twelfth Ordinary Meeting.

Wednesday, February 27th, 1867; Samuel Robert Graves, Esq., M.P., in the chair.

The following candidates were proposed for election as members of the Society :—

Alsop, John Alfred, 22, Brunswick-square, W.C.
De Salis, Colonel Rudolphe, C.B., 123, Pall-mall, S.W.
Freeland, Humphry William, Chichester.
James, W. H., 78, High-street, Camden-town, N.W.
Kime, William Thomas, Louth, Lincolnshire.
Leslie, Thomas Edward Cliffe, Union Club, S.W., and 22, Old-square, Lincoln's-inn, W.C.
Marsh, William Robert, The Rice Mills, Bromley, E.
Morgan, Fortescue J., Stamford.

The following candidates were balloted for, and duly elected members of the Society :—

Brand, Henderson William, 5A, Courland-grove, S.
Chaffin, Matthew Henry, 18, Hart-street, Bloomsbury, W.C.
Fowler, John R., 1, Mitre-court-buildings, Temple, E.C.
Green, John, 7, Sherborne-street, N.
Harrington, G. H., 5, Billiter-square, E.C.
Hayes, Robert, 1, Pembridge-square, Bayswater, W.
Hoff, Edward, Carpet Manufactory, Louth.
Hopkinson, John, York-place, Oxford-street, Manchester.
Isaac, S., 2, Hyde-park-gate, W.
King, Edmund, 1, Elvaston-place, Queen's-gate, W.
Layton, James, The Wilderness, Baldock.
Lee, Richard, 39, Lothbury, E.C.
Loughborough, Thomas, 23, Austin-friars, E.C., and Selwood-lodge, Tulse-hill, S.
Macintosh, William, 24, Paternoster-row, E.C.
Phillips, Henry Louis, 32, New Broad-street, E.C.

The Paper read was—

ON THE ECONOMY OF TELEGRAPHY AS PART OF A PUBLIC SYSTEM OF POSTAL COMMUNICATION.

By Edwin Chadwick, Esq., C.B.

As an apology for my bringing forward this subject, I beg to be allowed to state that from the practical origin of the electric telegraph I have regarded it with great interest, as a means of public and private economy, as an extraordinary means of saving time in intercommunication, as giving to bodies politic, as it were, a new and quicker set of nerves of sensation and of volition; and, as a branch of administrative study on public intercommunication, I have examined it, as a commissioner of inquiry into the means of establishing a general system of police in Great Britain, and have made particular inquiries into the special utility of its application for the public security. As a commissioner of the first general Board of Health, I have moreover had practical experience of its great value, for executive administration, during periods of wide spread epidemic visitations.

In a paper on railway communication, which I had to prepare when I had the honour to serve as president of the Department of Economy and Trade of the Association for the Promotion of Social Science I adverted to a public system of telegraphic post, as necessary for the safe and efficient working of railways, and as complementary to a proper and complete system of internal communication. Mr. Gladstone expressed to me a wish that I should develope that portion of my thesis separately, and more fully. I did so, and submitted a paper to him, and he transmitted it to the then Postmaster-General, Lord Stanley of Alderley, shortly before the change of the Goverment.

I have felt it due to the Society to bring the question of postal telegraphy before it as coming, as I conceive, under the same economic and administrative principles as those which my noble friend Earl Fortescue (then Lord Ebrington) and a committee agreed with me in proposing for the support of the Society, as bearing on the collection and the distribution of small parcels by means of the post.*

The leading positions which my colleagues of that committee agreed with me in taking, as respects the small-parcels post were :—

That there belong to the public, in the United Kingdom, in round numbers, ten thousand postal stations, and a service of twenty thousand persons for the collection and distribution of letters; that these public establishments, and the services of those officers (chief and subordinate), are available at a comparatively small additional expense, for the collection and distribution of small parcels for public and for other services; that private individuals or companies can only perform the like extent of service of collection and distribution for any one separate object by an equivalent number of separate establishments, and by the services of an equal number of persons, the separate expense of which for the one special service must be so enormous as to be prohibitory to the greatest amount of ordinary service needed by the public;—that, as a consequence, whilst private persons or trading companies can only extend their present means of collection and distribution at a loss, or at charges which must be practically prohibitory, the public postal establishment may give the requisite service at a low rate, with a profit—if, indeed, profit be the legitimate object of the service—a view which I hold to be a pernicious error detrimental to the freedom of trade.

Now, as to telegraphy. Whilst the public have these *ten thousand* stations and a service of twenty thousand persons, all the general telegraphic companies put together have only some nineteen hundred stations supplying about *thirteen hundred* places, and, I presume, only a proportionate number of persons engaged in the collection and the distribution of messages. In many of the large towns there are two or three competing telegraph companies, each with its own separate stations. It follows that, under these relative conditions, private or commercial telegraphy must be dear, and must be incomplete, and comparatively slow. And for this reason; that, for each of the eight or nine places now unprovided for, there must be a separate telegraphic station, a separate rent, with lights and coal for a separate office-keeper, and separate messengers to be maintained.

I am informed that, as a rule, it will not pay a private telegraph company to set up a separate station for the accommodation of a new neighbourhood unless it be assured an income of from £60 to £100 per annum or more, according to circumstances; or, as one company states, at least fifteen messages every day, and that, too, at the existing high tariffs of charges, which prove to be practically prohibitory of any further very greatly-extended use of telegraphic communication in this country. Private telegraphs, under the existing conditions, are, and must be, comparatively dear as well as slow, on account of the comparatively long distances necessarily requiring the additional distance and time for porterage of messages. The postal stations, being as eight or more to one of the telegraph stations, the distances of the telegraph deliveries must be (except in the larger towns) throughout the country as eight to one or more. This will the least apply to the more closely populated districts, and the most to suburban districts. For example, in Richmond, where I live, there is a telegraph station, but there are adjacent districts, such as Kew, Mortlake, and Ham, where there are postal stations but no telegraph stations. A telegram from London to Ham must be sent three miles from the station at Richmond by a foot messenger, at the rate of sixpence per mile, and it will be an hour reaching its destination; instead of which, if it were from the postal station at Ham, it might be delivered in perhaps an eighth of the time, or in a few minutes. The telegraph tariff from London is a shilling, but the charge for the porterage of the message to Ham is eighteen-pence. The tariff for a message from London to Manchester is eighteen-pence, but to all the suburbs over three miles the charge is a shilling per mile extra for a horse messenger, and where there are postal stations, where there need be no extra charge for porterage, the porterage, under the existing system, costs more than the message. In the interior of the densely-populated districts, where the difference of the distances for delivery is not so great, there are yet two or three separate companies, whose separate establishments must be paid for by the public.

I repeat, then, that under the existing conditions of telegraphy by separate trading companies, telegraphic communication, to pay, must be dear—must be incomplete—must be slow—as compared with telegraphy in Belgium, in Switzerland, and in Germany, where the public postal establishments are properly utilized for a responsible public service. Even on the main lines, and between the great towns, the trading companies' service is often vexatiously uncertain and comparatively slow, for this reason, amongst others (as recently explained in answer to complaints of messages, which ought to be delivered within one hour, being detained as long as four) that the railway companies, having the privilege of using the telegraph for working their lines, have the priority of the use of the wires, instead of having their own separate wires, which, under a proper system they would have, and thus the delivery of private messages is frequently delayed.

Besides being dear and incomplete from the cost of separate establishments, trading telegraphy is necessarily dear by reason of the local burdens to which it is subject as an enterprise for private profit. It is subjected to parochial taxation, which in one company amounts, as I am informed, to 9s. 9d. per mile per annum on between forty and fifty thousand miles of wire. A

* See *Journal*, Vol VI., p. 527.

body of traders holding forth promises of large profits seek to obtain way-leave for their posts and their wires over private houses and private lands, as well as over public roads. As the company is based on the principle of making charges on the necessities of private individuals for communication, so private individuals or local bodies think themselves justified in making exactions on the necessities of the mere trading company. "Why," says the attorney, to his client, the landowner or other, "should you give them the use of your premises, or the privilege of passing over your land, without payment? They can't compel you." Sometimes the companies are obliged, by refusals or by private exactions—including the exactions of the local bodies having control of parish or other roads—as the price of the privilege sought, to go at much expense by circuitous routes. If telegraphic communication were conducted as a public service it would, of course, be freed from local taxation and from such exactions, which add to the other charges generally prohibitory of the required extensions. I am assured that, on the whole, future extensions needed may be made under public authority at half the expense that must be incurred by the trading companies, and the country, instead of being disfigured by the posts and wires of several establishments on the same line, would be better served by one. In the French cities, under a postal system of telegraphy, wires are carried conveniently along the eaves of houses, without the number of web crossings from separate companies which are becoming very unsightly as well as inconvenient in London; the inconvenience as well as the expense increasing with the number of the companies, whose wires frequently cross and, in times of storm, touch each other, when messages are curiously and comically flashed in wrong directions, producing confusion and nonsense, of which strange examples occurred during the great snow storm.

Under the existing conditions of dearness and great incompleteness in England, the telegraph may be said to be a class telegraph, in regular use only for stock-brokers, produce-brokers, and the higher class of professional men. It cannot be called a domestic or a general public telegraph. For domestic use it is generally only available to very well-to-do classes—the few. For the higher middle classes its use is chiefly confined to extraordinary occasions, to deaths, to mortal sickness, or impending calamity. So much is this so, even amongst wealthy families, that at first a telegraphic message often gives a shock of alarm—that something sad has happened, and is to be communicated. To the many, the lower middle classes and the labouring classes in towns, the present charges may be said to be entirely prohibitory; as also to the agricultural classes. Now it is of national importance that the telegraphic communication should be made to penetrate and animate the agricultural community. Though a farm may be included in a regular postal delivery it is of common occurrence that the cost of a telegram to or from the farmer is half-a-crown, and half-a-crown in the imagination of a farmer is as big as a cart-wheel. To the whole agricultural class facilities for sending district messages would be most valuable. The farmer would be enabled on the exigencies of culture, impending storms, or sudden necessity to get in crops, to telegraph for hands, horses, and assistance; to receive telegraphic messages from his salesman so as to save him from going to market. Salesmen for market garden produce and other transactions of a large amount, for provisioning the larger markets, have not the use of the telegraph, except for wholesale transactions. A cheaper system of postal telegraphy would even be available for the ordinary business of the working classes. An artisan could seek work by it, or, being known to be on the look out for a job, might be telegraphed for, and at the expense perhaps of a sixpenny telegraph, might save half a day or a day, or, having a job in hand in a remote place, on finding himself short of some material, might save a day's time in waiting for it. The saving of time—the staff of which business as well as life is made—would be considerable if the telegraphic system were to be made more general and cheaper.

For the more ready deliveries in remote rural districts, where the messages may be too few to pay for keeping foot messengers in constant attendance, an arrangement might be made with the schoolmaster of the national or the village school, under a postal system, using the scholars as a corps of ready messengers for the delivery of messages which might arrive in the interval when the letter carrier is on his rounds. A notice would be rung to the school, when the master would name some good boy, who would gladly quit his lesson at the desk and would receive a practical lesson in a service of trust and punctuality, in which he would gladly run over a mountain with the Queen's bag for the reward of a penny.

A valuable suggestion for the dispatch of very cheap messages by the post is made by Professor Wheatstone. He conceives that the messages may be divided into those of ordinary and those of special dispatch by telegraph. There will be a proportion of persons who will not want an answer immediately, or within an hour, but only within two or three hours, or within the day, or so as to save one ordinary postal delivery, to get an answer to some inquiry as to whether a person is at home, where he is gone, when he is expected, how an illness is proceeding, or matters of the like sort, not requiring very special dispatch. The message, with the prepayment of the extra postage stamps, at a less price than for the special delivery, say for 4d. against 6d., or 6d. against 1s., might be put into the pillar, or other post. On being taken to the office, the message would be telegraphed from thence and delivered to its address by the ordinary delivery, so as to save the expense of a special delivery at either end.

Secondary postal telegrams of this sort would have the advantage of freeing the service from the excessive pressure now experienced at particular hours for the dispatch of special messages.

As there are simple and convenient cyphers for private use, the telegraph would, under a good system, be used much more than it is now by private persons and for social purposes, by those who are averse to the transmission of open messages. The companies at present charge double for messages in cypher which would, under improved arrangements, require little extra labour.

Now, as to the general economical or commercial effects of complete and cheap telegraphy. There are indications of its importance in every-day retail commerce, and that the general action of a cheap system of postal telegraphy, more especially in combination with a cheap system of small-parcel post, such as we contended for, and is now in use in Switzerland and Belgium, will improve the whole retail trade of the country, and effect large economies by saving stocks of goods. For example—I find that in the metropolis there are large wholesale houses in the City which have private telegraphs to west-end retail shops, which, instead of keeping large stocks, telegraph for the goods in the City as they are required. Chemists and druggists at the west-end have now private telegraphic communication with the wholesale druggists in the City, whence they get medicines and drugs fresh and fresh as they want them, instead of keeping them deteriorating in store. I am informed by one trading firm in Zurich that, by means of the improved system of telegraphic communication, combined with a parcel post delivery, they are enabled to carry on business with one-third of the stock they used to have before. I am assured by Mr. Cor Vander Maeren, the President of the Tribunal of Commerce at Brussels, that the like effects are manifest in Belgium. I am informed of one warehouse in the city of London, where, by means of the international telegraphic communication, they do as much business now—by economising their supplies by quick

information—with £20,000 of capital, as was formerly done by £100,000 of capital. Now, this system would enable village shopkeepers to do the like. The saving from the mere deterioration of goods kept on hand in large stocks in remote places will be, collectively, considerable; for example, the grocers' stocks—the teas, the fruits, raisins, currants, and such like. On ordinary occasions in domestic life directions may be telegraphed to farm servants and establishments; professional men will forward instructions from their suburban residences to their offices in the City; manufacturers will, from their offices in the City, give directions to the manufacturers in the suburbs. A complete and cheap telegraph would be of special importance for the maritime community, and for the mercantile marine, by enabling pasengers and goods to be collected, departures to be expedited, cargoes to be distributed, and parcels to be forwarded. The general economical result would be, practically, to concentrate the whole country.

Our objects, as respects the parcel post, are frustrated by the competing railway companies, who cannot be got to agree among themselves to a uniform goods rate, which it would be so much to the interest of the shareholder as well as of the public to obtain. An opening for the application of our principle as regards the parcel post, has, however, been obtained from the Government, who have conceded the privilege of transmitting samples of goods or other objects by the post.

Having described the conditions of great incompleteness and dearness, as well as comparative slowness, which are inherent to a service by separate competing trading companies, and the obstructions, loss of time, and power occasioned by these conditions to private trade and social life, I now proceed to notice the losses or privations of gain occasioned by these conditions to large branches of the public service, to the police force, to the army and navy, and to the general government of the country.

The adoption of the electric telegraph for the metropolitan, in connection with the rural or county police and general police, would almost double the efficiency of those forces, and would peculiarly serve to promote the habitual use of telegraphy in the rural districts, and its completion as a general national system. The same lines and bearers that led to the police stations, would lead the wires to the adjacent post-office stations, or *vice versa*. Even in the ordinary daily affairs of the rural districts, suppose that gates have been left open and cattle have strayed, or horses been stolen, or a robbery committed. Forthwith the farmer would send to the police station, and a force would everywhere be put on the alert. A known or suspicious character is observed by the police of one district to be on the move; the police of all the other districts would be put on the outlook. At nightfall, again, the poachers might be seen leaving the town by the police, who would telegraph warning to keepers to be on their guard. On occasions of fire, the complete telegraph, carried within reach of every village, would be of great use, though now unknown, with only one-ninth part of the country imperfectly covered. The extra service to the police force would justify contribution to the public telegraph establishments from the public grants now made by Parliament in aid of the county police.

The Minister of War for Belgium declared that placing the railway under public control had doubled the efficiency of the military force, and that the electric telegraph would double it again. This declaration, I believe, would receive the assent of all military men conversant with the subject. I need not enlarge on the peculiar need to this country of all economies of our war force, whether naval or military. At present our War Minister or the Commander-in-Chief writes a telegram on the company's form, sends it to the company's office by a messenger, and pays the fare, I believe, as any one else does, and then it is forwarded to a barrack or station by another foot messenger. In this slow operation a Fenian clerk might hear to what place the commandant is sending, if not what he is sending about. On looking at a map of the country, within a radius of fifty miles round Cahirciveen, it will be seen that whilst there are about seventy post-offices, there are only seven or eight telegraph stations, a deficiency of about nine-tenths of the available means of quick public information—a deficiency occasioning messages and despatches to be sent slowly by messengers long distances, with the risk of being waylaid and shot down. Of course telegraph wires may be cut, yet that would be an indication of an enemy's presence, and they are easily repaired and guarded. But the deficiency is of means of warning and protection against external as well as against internal enemies. In Prussia, I am informed, indeed it is well known, that in the late war the directing general and tactician was with his own telegraph and cypher in a room in his office in Berlin, where no one knew what was being done, but whence orders were being flashed to separate divisions of the great army, spreading them wide over divergent bases, so as to confound and mislead the enemy, then gathering them together and concentrating them, with a rapidity unknown, so as to bring overwhelming masses to bear upon him at the decisive battle. If anything had gone wrong, reserves might have been telegraphed for, and brought from the plough, or from the forge, or the work-bench, through the postal stations to the most remote villages, and got from thence into rank with a rapidity never before known. The several armies, and even the wings of the same army, were wielded as one force from a department in Berlin more speedily than they could have been by cross messages between one division and another, even if they were only a few miles distant from each other.

Private communication was much interrupted for a short time during the war in Prussia, not, as I am informed, on account of the danger of the conveyance of intelligence to the enemy, but mainly on account of the impressment of the most skilful postal telegraphists for the service of the army during the short and great campaign. The success of that campaign and the results, which surprised our Government as well as others, were largely due to the perception and the use made by Prussia of the public advantages of the principle of unity of administration, as applied to a complete unity of communication, all means of communication for the public including the railways as well as the postal telegraph. Captain Webber, R.E., who has closely examined the continental systems of telegraphy, especially for military purposes, states that he considers that the Prussian system has the advantage over all, for private or popular purposes.

The Government of France is carefully protecting its sea coast by complete lines of telegraph. With us, where the protection is so peculiarly needed in time of war against invasion, nothing like this is being done, whilst vast sums are being spent on internal fortifications. Most certainly, in times of peace, for the Coast Guard service against smugglers, as well as for storm warnings, and for succour in the case of shipwreck, in which some five or six thousand persons are submerged, and between seven and eight hundred persons annually drowned, on our coasts, a complete arrangement of telegraphic communication would be the means of saving vast amounts of money, as well as life, and preventing wrecking and much crime. Our war department ought to have the means of complete and direct communication with every barrack and military or naval station in the country. Powers are reserved to take possession of the private trading companies' telegraphs in time of war; that is to say, in a time of hurry, to take possession of disjointed and imperfect works, extending over only one-eighth of the country, unprotected—with wide gaps of thinly-occupied coast unguarded—which present nothing of profit to

private trading enterprise, but which offer much to the enterprise of invading enemies.

As against one sort of invasion—an invasion, indeed, more dire and ruthless than that of war—the invasion of pestilence, which slew in one year seventy thousand men, women, and children—I had some personal experience of the uses of a telegraphic service. On the visitation of the Asiatic cholera in 1848, we had a very scanty force of competent medical inspectors attached to the General Board of Health. We had despatched two of them to Hamburg, to watch the progress of the epidemic there, and they were at Hull on the point of embarking, when, late in the afternoon, I received a telegram from Edinburgh stating that a case of Asiatic cholera had appeared there. I immediately telegraphed to Hull to detach one of the two inspectors to go on in the next train to Edinburgh, which he did; and to the astonishment of the people there he arrived the same evening within a few hours of their afternoon message. Instances of similar alertness in the direction of a scanty force during the progress of that epidemic were numerous. Immediately an inspector had completed his instructions for meeting the epidemic in one district, without the delay of a post he was, by telegraph, directed to another and distant point of a new outbreak of which we had information. We certainly were enabled by the telegraph almost to double the efficiency of the very small force allowed to us, although the telegraphic service was only available for main lines of communication. If there had been a complete system of telegraphy with every postal station, as now contemplated, and we had been enabled to receive returns of the progress of the epidemic, and transmit directions to medical officers, and information as to assistance hourly as well as daily, the efficiency of the service would have been vastly augmented. Probably it might be so in relation to the cattle plague.

To some persons it might, at first sight, suggest itself, that a consolidation of the central portion of the telegraphic service, apart from the postal service, would be the most eligible course, and that the existing service is beyond the power of management, but those who are conversant with large business arrangements, or with large spheres of administration will be aware, that with system, and under competent direction, the more an establishment has to do, the better every part may be done. It is with this principle in view that I have spoken of the eligibility of the combination of branches of the public service—such as the naval and the military—with the private service of telegraphic communication. I consider, however, that the practicability of the combination is settled by the examples I have cited of continental states, if it were not determined, as I believe it is, by the high administrative authority of Sir Rowland Hill. With respect to the existing telegraph companies, I am unaware of anything disparaging to their general management. Such default as there may be in their position is the fault of the legislature, and this is due to dereliction of the primary public duties of any properly-constituted government, and the evasion of responsibilities to maintain complete and cheap means of communication, as a public service. The companies have laboured through difficulties and expensive trial works, and *bonâ fide* conflicts, to accomplish the ends they had legislative sanction in undertaking, and much of this expense would probably have not been incurred had the service been early undertaken by our Government, as it has been by the Governments of Belgium, Switzerland, and the chief German states. The companies would be entitled to compensation on the principles recognised in such cases, which need not, as assumed, be by a direct lump payment, or any payment at all from the Exchequer, but by a special telegraph stock, a money raised on the public security, giving the shareholders some security for their existing dividends, and a payment by giving interest on the capital expended. Instead, however, of adverting here to the losses by the non-application, as I conceive them, of economical or administrative principles, we have rather to show the gain to be derived from reverting to them.

Assuming that the telegraphic communications were not to increase, and that the stations were not to be extended beyond those of the existing companies, it may be safely stated that the savings of establishment charges by the consolidation of three separate establishments, and by utilising the public establishments, would be found, on close and competent inquiries into the details, to suffice amply for the purchase of the companies, and the compensation of the permanent officers on the usual conditions, and would, moreover, leave a surplus for insuring against loss by early and large reductions of rates upon a uniform system.

The important question which has to be determined for the public is the rates at which the required service may be given to them under unity of management, and also the question of uniform rates. The main ground established by Sir Rowland Hill for the penny postal system was, that whether a letter was delivered in London, or was sent from London to Edinburgh, there was a difference of one thirty-sixth in the cost; that it was not, therefore, worth while to put either the sender of the letter or the post-office to the trouble of taxing the letters. It might at first sight appear that there would be a greater difference in the case of telegraphic messages, arising from the length of the wires. But long land lines of wire are to some extent paid for by each large town or district through which the line passes, so as to properly distribute the charge locally. If, moreover, the uniform franc rate be good for all Switzerland, or the half-franc rate be good for all Belgium and other continental states, we may assume that the principle of uniform tariffs is good for this country, as in the case of letters.

The several great special public uses to which a complete system of telegraphy is subservient, as separate sources of large economies ought, by the distribution of establishment charges over the widest extent of service, to contribute to the reduction of the tariffs, as well as the completeness and punctuality of the deliveries to private individuals. The uniform franc or tenpenny message, all over Switzerland, yields a surplus and increasing revenue; and I am informed that a further reduction of the tariff is contemplated. With a wise state economy they have reduced their uniform letter postage to nearly a halfpenny. In Belgium a reduction has been made from the uniform franc to a uniform half-franc; and M. Vinchens, the able engineer-in-chief of the service, informs me that the number of telegrams have, within a year, been more than doubled, and the gross receipts for the interior service increased more than 18 per cent. There have been some augmentations of establishment charges, apparently having relation to international messages, which have prevented the net returns being as yet fully replaced, though they are expected to be in a short period. Were it otherwise, conceive the immense economical advantage of doubling the speed of business transactions and other affairs by the reductions made. I do not, however, accept the instance of Belgium, a large proportion of whose population is very poor, whose letter communication is little more than half that in England, as a guide for this country, with its greater commerce, manufactures, and wealth. But in London itself, a telegraphic company, for sixpenny district messages, failed "commercially," and was compelled to raise its tariff to a shilling, being borne down, I presume, by the weight of the separate establishment charges, and the consequent incompleteness of its stations, until it was taken up by another company for the delivery of its messages. On the other hand we have in Paris an example of a postal district telegraph which has succeeded in a remarkable manner, with an uniform half-franc, or call it a sixpenny, message. In six months from the time of the reduction from one franc to a half-franc, the number of the messages was

augmented tenfold; but even in Paris, I do not admit that, either in business or in social life, the value of time equals that in London, or in our chief manufacturing cities.

The judgment of the postal authorities in England would, I apprehend, be that it would be safer to begin with a uniform minimum of a shilling rate—*i.e.*, safer for them not to be run off their legs in the first instance. This last is a consideration, to which it is fair to give due weight; otherwise, when a habit is to be altered or framed, the greatest speed will, as a rule, be eventually made, by giving the greatest stimulus to change, in the first instance, charging the lowest rate contemplated, and warranted by experience such as that which I have cited from Belgium.

One special advantage derivable from the proposed extended utilisation of our postal establishment for telegraphic communication would be, that it would serve as a source of contribution to a better payment fairly due to the valuable aud underpaid officers engaged in it; and as a means of getting more intelligent and trustworthy persons into the lower departments of the service, and in remote districts.

It is inconceivable that in the face of Continental experience and example the present state of telegraphic communication in this country should be permitted by the public to be continued, and, certainly, all delay of reform must be at the expense of the public for increased compensations. I may add that in the senate of the United States, a committee on the post-office and on the post roads has urged that the post-office department shall be authorised to undertake postal telegraphy, as a work of necessity and public convenience.

Let me recapitulate the chief conclusions which I have to submit. They are—that cheap and complete telegraphic communication, with the speedy and punctual delivery of telegrams, next to the cheap, speedy, and punctual delivery of letters, is of the highest importance to the manufacturing, commercial, and agricultural service of the country, as well as to the service of the state, for the army, the navy, and the police. That the present telegraphic communication of the country is made unnecessarily dear, by the charges of several incomplete establishments, to perform a service that might be better performed by one. That there are in the United Kingdom ten thousand post-offices, and a service of twenty thousand persons engaged in the collection and delivery of letters, available for the collection and delivery of telegrams, as proved by the example of Belgium and Switzerland, and other well-governed continental states. That the private telegraph companies have only some nineteen hundred telegraph stations—a little more than one to five of the postal means of ready collection and speedy and cheap delivery. That, by reason of the charges for separate establishments, rents, and payments for separate services, with local taxes and extra charges, to which trading telegraph companies are subjected, they cannot adequately multiply their existing stations and means of speedy delivery except at double rates of cost and at extra rates of charge, which are practically prohibitory to the habitual use of telegraphic communication by the great mass of the community. That, by the use of the existing postal establishments pervading all parts of the country, the postal service may—as is done by the postal establishments of foreign states—convey telegraphic messages at low rates of charge at a profit, which private companies can only convey at the same low rates, at a loss. That, by reason of the existing conditions of the burthens of multiplied and separate capitals, and of the restricted number of stations, and distant and dear porterages, with consequent high rates of charge, and in many cases slow deliveries, the habitual use of telegraphic means of communication is chiefly confined to the few; to certain classes for large transactions, such as those of the money markets, to large manufacturers, bankers, and professional persons, and to domestic uses on extraordinary occasions. That telegraphic communication in this country has not been brought within the means of habitual use by the great body of retail traders, nor of the agricultural or middle classes, nor of labourers throughout the country. That it has not yet been brought into complete and proper use for the public by the police, by the navy or the army for the purpose of internal defence or for the action of the chief administrative departments of the State, as it is by responsible constitutional Governments on the Continent. That out of the economy of the charges of the separate establishments of separate private companies produced by consolidation, together with the increased traffic obtainable by telegraphic communication through the post at reduced tariffs, fair compensation may be made to the trading interests in public telegraphy which have been allowed to be formed, and that the proper responsible duties of the Government for the maintenance of the safe and free use of all public means of communication, as a service, may be advantageously resumed without direct expense to the revenue, and with large indirect advantage to it by the augmentation of the commerce and production of the country.

On this subject of inter-communication, which is really one great means of promoting free trade, as well as social intercourse, it is becoming to this country, as constituting an emporium for a large part of the commerce of the world, to have regard to international as well as domestic convenience. By Sir Rowland Hill's great improvement in administrative art and science, England has taken a lead amongst civilised nations in inter-communication by letter. About three years ago there was an international congress held in Paris of executive officers engaged in the postal departments of the chief continental states, to consider and promote improvement in international communication by letter. At that congress, England had its place. Last year, a like congress was held of the executive officers of the continental states to impart to each the benefit of the domestic experience of all scientific, mechanical instruments, alphabets, as well as in administration, and to promote improvement in intercommunication by the telegraph. At that congress, and on that subject, in which England had the lead in the wonderful application of electricity—one great glory of our time—the English Government, to its European scandal for its torpidity, had no place, and England no representative. Is that to continue to be so?

Its proper place may, however, be gained for it by action on disinterested Parliamentary opinion; for there does not stand opposed to the application of correct economic principles in this branch of inter-communication by telegraphic conveyance, the like amount of strong personal interest, nor the like large masses of capital in different categories, with claims to compensation, nor *primâ facie* difficulties of management requiring fatiguing attention and investigation, as there does for the reform of railway conveyance. The conditions of the conveyance by telegraph being less complicated and more manageable, with an authority prepared and competent to deal with them, as, I believe, the chief permanent officers of the post-office to be, there is better promise of earlier success in obtaining the reform now in question. I have no doubt of the eventual general application of the reformed principles governing intercommunication, which I have so long advocated as important to the progress of commerce, manufactures, and the arts, which this Society is united to promote; I believe the cost of every species of conveyance may eventually be thus reduced one-half. Great as have been the benefits derived from the repeal of protection duties on corn and other articles, I believe it will be found that they are inconsiderable as compared with the benefits derivable from the removal of excessive charges on transit, as well as fiscal and other obstructions to free inter-communication.

DISCUSSION.

Mr. John Davis observed that Mr. Chadwick, in enumerating the various uses of the telegraph, had not adverted to a singular abuse of it, which had been invented during the recent war in America. It was what they called "tapping" the telegraph; or, in other words, intercepting the messages and possessing themselves of their contents. That was a more ingenious plan than the cutting of the wires; and, as the subject of telegraphs was under discussion, he thought this fact deserved to be mentioned.

Mr. W. B. Galloway remarked that the importance of complete arrangements for telegraphic communication throughout the country could not be over-estimated. He thought Mr. Chadwick's proposal that the existing postal arrangements should be extended to the delivering of messages sent by telegraph was perfectly practicable, and would be highly beneficial to the public. The system on which Sir Rowland Hill founded the penny postage in this country might, he thought, to a great extent be made applicable to telegraphic communication, especially by adopting a uniform rate of charge, and arrangements might be made for the delivering of messages and letters every half-hour, by the present or an increased staff of letter-carriers. The accomplishment of the grand project of establishing telegraphic communication between this country and the United States might, to a certain extent, be regarded as a fulfilment of the prophecy that "Knowledge shall run to and fro in the earth." He had no doubt that in a short time such arrangements would be made in connection with the postal system of the country as would enable the community at large to avail themselves to the fullest extent of the advantages afforded by telegraphic communication.

Mr. Webber remarked that he did not agree with the author of the paper in desiring that the existing telegraphic system should be taken out of the hands of the trading companies and placed in those of the Government. He was not himself a believer in Government interference in such matters. They were told in the paper that there were a great number of places to which telegraphic communication did not extend; but at the same time they were also told that in such places farmers regarded the half-crown which they were now charged for a telegram as a thing "as big as a cart-wheel." As a taxpayer, he (Mr. Webber) protested against supplying those gentlemen with such a public convenience as was now proposed until their range of vision brought the half-crown down to something like its normal circumference. They were told that the District Telegraph Company in London had failed, commercially, on account of the little use made of it by the public. In his own experience, in relation to the loss of some property on its way to his premises, he might state that the very public department which of all others ought most to avail itself of telegraphic facilities—viz., the police—neglected to do so in his own case, and left the investigation of the matter to be carried on through the ordinary channels of official communication. He was not quite sure, looking at this instance, whether, if Mr. Chadwick's proposal were adopted, the same red-tapism might not be extended to the whole telegraphic system throughout the kingdom.

Mr. J. H. Mackenzie was inclined to support the views of Mr. Chadwick. He had no doubt there were many matters which could be best carried out by private enterprise, but he thought the telegraph system was an exception to the general rule. London being the great centre of the trade of the country, it was most desirable that there, more especially, every possible facility in the way of telegraphic communication should be afforded. There had been a company formed known as the Universal Private Telegraph Company, which, however, had not been able to develope itself to the extent that was expected, owing in a great measure to the monopoly which the other telegraph companies possessed. One great objection to all public systems of telegraphy was that the messages sent were made public, whereas the perfection of telegraphic communication was privacy. The great advantage of the Private Telegraph Company was that business firms having houses in the City and at the West-end were enabled, by a well-known simple instrument which could be worked by a lad after a few weeks' practice, to transmit messages without anyone else knowing anything about them. A few years ago he endeavoured to bring about some arrangement for working the above-named company in connection with the other principal companies, with the view of extending the system of private communication; but after a great many interviews he failed in doing so. He conceived that one benefit to the commercial world and to the public, from the Government taking the matter under its superintendence, would be that they would not look so much to profits on the transmission of messages as to the extension of free trade and free inter-communication throughout the country; and, supposing there was a loss at first, a portion of the surplus revenue of the post-office might be applied to meet it. He thought the benefits of easy and rapid communication ought to be given to the public to the fullest extent possible, and that the surplus profits of the postal department ought not to go to benefit the taxpayers, but to the improvement of the system of communication. They would not desire a lower rate of postage than that which at present existed, but he thought that department might fairly be asked to undertake the risk of any pecuniary loss arising from the proposed extension of the telegraph system under its management. He suggested that the present minimum charge of a shilling per message might be reduced to as low as threepence, and any loss that thus occurred would be more than met, in his opinion, by the surplus profits of the penny postage system. By extending the advantages of the telegraph to all towns having a population of 5,000, a very large additional portion of the public would be benefited. The postmen might be the means of delivering the messages, and the delivery, both of letters and messages, in large towns might be made hourly instead of at longer intervals; the uniform charge of 3d. would pay the expenses of the extra carriers that would be required. Letter carriers in the country would only be too happy to fill up the time which they now employed in business, other than that of the post-office, by delivering these messages. The present existing companies might be left to carry on their present business, even in competition with the government, for while admitting that, as a rule, it was undesirable that government should undertake to enter into competition with private enterprise, he thought this was a national question which might be regarded as exceptional.

Mr. Blashfield agreed as to the importance of extending to the smaller towns telegraphic communication, which could be carried out at less expense under the auspices of the Government than by any other means, inasmuch as the wires could then be laid along less circuitous routes than when the matter was in the hands of trading companies. The placing the telegraph in connection with the post-offices throughout the kingdom would be an immense advantage. At present, even in towns returning two members to Parliament, the telegraph arrangements were often very incomplete. In many places in the midland counties, for instance, the post-offices were opened at half-past six in the morning, and the letters were delivered before seven; but they could not send off a telegram in reply till nine or ten o'clock. In many cases the persons in charge of the telegraph were scarcely able to read writing, and the most absurd mistakes were sometimes made. In some parts of the country it was necessary to go miles to a telegraph station, because, perhaps, some land-owner had refused to allow the wires to be carried over his property. Another advantage of the proposed connection of the telegraph with the post-

office was that the wires would be more under control for the use of the public than they were at present, and a greater amount of protection to them would be afforded than was now the case.

Mr. Campin remarked that the last speaker was in error in supposing that the telegraph wires could be carried by a more direct route, if the system were under Government control, than they were at present. A trespass upon the rights of private property could no more be committed by the Government than by a private company, except under the authority of an act of Parliament, which would be necessary in each case. The same gentleman also suggested that if any pecuniary loss arose from the system being carried out under the management of the post-office, the surplus revenue of that department should be applied to meet that loss; but if there was a complete system of telegraphic communication available to the public for all the concerns of life, it might be expected that there would be a corresponding decrease in the number of letters, and a proportionate falling-off in the revenue derived from that source, so that the surplus might not be so large as it was at present. That was an element in the question which ought to be considered.

Mr. W. Hawes said this subject was very much akin to other questions which his friend Mr. Chadwick had brought before this Society on previous occasions; the point under discussion being, in fact, whether the great works of this country could be carried on more cheaply, more usefully, and with greater public advantage, if placed in the hands of the Government than by being allowed to remain in those of the great companies which now conducted them. For his own part, he thought Government interference in any such matters was most undesirable. All present would agree that if telegraphic messages could be sent for a penny or twopence each it would be a very great boon to society. But, conceding all the advantages which Mr. Chadwick had pointed out as likely to result from greater facilities in telegraphic communication, he differed from him entirely in his view that these could only be obtained by Government interference. Why did not the Government first commence the system of telegraphy, instead of leaving it to the public to do so? If they were so anxious to benefit the public, and to go in advance of public intelligence and enterprise, why did they not originate the system, instead of waiting till the public had incurred all the risk and expense in bringing to perfection one of the most beautiful applications of science that had ever been made in this or any other country? After so many years had been spent in bringing the system of telegraphy into its present state of practical utility, solely by private enterprise, the Government were ready to take it out of the hands of those who had really done the work, asserting that they could carry it on better and more cheaply. Undoubtedly, if Government were to take advantage of all the discoveries that had been made up to the present moment, and without showing any consideration for shareholders—for those who had advanced their capital to bring the system to its present perfection—if they were to start with it now, when all difficulties had been overcome, undoubtedly they could work it more cheaply than was done by the present companies. But would anyone say that Government ought to take possession of all these works without giving ample compensation to those in whose hands they now were? And if this compensation had to be given, where was the advantage? Mr. Chadwick said Government would supply the telegraph to so many more towns, and would perform the service more effectually; but of this there was no proof. If Government were to have the control of the railways and the telegraphs, there was no end to the application of the principle when once it was admitted that Government could do these things better than the public. They had been told by one gentleman that the Government could carry the wires over private property in a way that a company could not do, and by that means the nearest route could be secured. Even if this were so, there would be little or no advantage, for it made scarcely any difference whether one telegraphic line was a few miles longer than another. The difference of time in transmitting the message was not perceptible; it was only a question of cost of construction, and it was found to be cheaper to carry the telegraph along the side of a railway, than to take an independent direction across the country. A company was started some time ago to carry messages at a uniform rate of sixpence for certain distances, and a shilling beyond. That company started with confidence of success, but it did not obtain it; not that it had not plenty of business; but each year the loss was greater, because every message transmitted cost more than was paid for it. They could only pass a certain number of words per day through the wires; it was simply a question of having the wires fully occupied or not. The concern he had referred to was merged into the old company; and he did not think the public were materially injured. Mr. Chadwick had spoken of the competing telegraph companies, but, practically, there was but one company, though some of the railways had telegraphs of their own; for instance, the South Eastern had a line of wires, of which the public had the benefit, by which many towns were supplied. All the advantage which would be gained by the Government taking the telegraphs into their hands would be the concentration of management, which had been dwelt on in the paper; but that the work would really be done more economically, or more beneficially, under Government monopoly than under the present system he (Mr. Hawes) denied; and he believed the public would be better served in this, as in other matters, by doing the work themselves, than by intrusting it to the hands of Government.

Mr. Hancock thought the case made out in favour of the telegraph system being taken into the hands of the Government was so strong as to justify a departure from the ordinarily sound and unimpeachable laws of political economy. The analogy between letters and telegrams was exact, except in one particular. letter was sent by railway to its destination; a message was forwarded by means of a wire. The writing a telegram was analogous to writing a letter; the only difference was that it had to be committed to another person who sent it by the wire, and had then to be rewritten by another official at the receiving office, and to be delivered at its destination. He thought it had been shown that the telegraphic system could be worked in connection with the existing means of collection and delivery of letters which constituted the principal cost of the postal system, for they had been told that the difference in the expense of delivering a letter in London and sending it to Edinburgh was only $\frac{1}{36}$th of a penny. The larger proportion of expense, therefore, was in the collection and delivery of the letters, not in the transmission. He thought this was a strong ground for asking the Government to take the telegraph into their hands, and combine it with the postal system. They had seen that on the Continent the telegraph system was more convenient, cheaper, and more certain than in this country, and this had been brought about within the last few years, for formerly the telegraph service on the Continent was irregular and the charges excessively high. With regard to the failure of the London District Telegraph Company, the truth was that this was chiefly attributable to its having attempted to do more than its capital could carry out, and in the contemplated extension of its system it was brought to a standstill for want of capital. He thought if that company had had capital enough to carry out its plans in the manner contemplated, it would have been a success instead of a failure.

Mr. Seymour Teulon said there was no doubt that if every small town and village in England could be provided with telegraphic communication at a cheap rate,

it would be a great benefit to those places; but there was one great difference between the carriage of letters and the sending of telegraphic messages which should not be overlooked, viz., that letters were collected and distributed by the post-office, but they were carried by private companies. It was true the authorities had the power to send their own trains with the letters, but they found it more economical to send the mails by the public trains, and, on the whole, he believed they were satisfied with the way in which the service was performed. In the case of the telegraph, only one wire could be used for a certain amount of messages. If more messages were required to be sent an increase in the number of wires would be necessary; but in the case of letters, the number of bags composing the mail might be multiplied to almost any extent, and the whole could be delivered at the same time, and carried at the same cost, to the post-office, while, in the case of the telegraph, the expense was increased in proportion to the number of messages sent. There was also this further difference; in the case of letters, there was of course complete privacy, while all messages, even of the most private character, must necessarily pass through the hands of the telegraph clerks at the offices of transmission and delivery; and in the event of the system being transferred to the post-office, we should be placed in the startling position that our most secret communications would all pass through the hands of Government officers, and he thought the public would hardly like to send private messages through that channel. Another difficulty was that it was an essential element in telegraphic communication that there should be immediate delivery of the message. Unless that were ensured, the very essence of the system would be lost. But one of the main points in Mr. Chadwick's proposition was that the ordinary letter-carriers should have the charge of delivering the telegraphic messages; another suggestion was that the boys at a village school should be employed for that purpose; and a third suggestion was that the rural letter-carrier would in that way find full employment for his time. For the reason just stated, viz., that promptness of delivery was an essential point in the system, he thought those suggestions must be at once discarded. If the post-office undertook this work, they must have the means at hand for an immediate delivery of the message, otherwise they would fail in the very object sought for.

Mr. Scudamore (responding to the invitation of the Chairman) said, in complying with the request of the Chairman to say a few words on this subject, he did so under a disadvantage, because although he might state that the officials of the post-office had, some time since, proposed a plan, which was now under the consideration of the Government, relating to this question, he was not at liberty to describe it in detail. If the Government had come to a decision upon the subject he would have been most happy to have submitted the full details to such a meeting as this, because he was confident that any objection which might have been raised would have been advanced in a thoroughly public spirit, and, probably, the post-office would have derived benefit from the consideration of those objections. Thus much, however, he might say, that though he had no claim to all the good words Mr. Chadwick had said in reference to the management of the post-office, he thought they could do more to facilitate communication throughout the country than the existing telegraph companies were able to do. He thought he could, at the proper time, prove that the post-office could, at much less cost than could the present companies, bring telegraph stations nearer to the public, and at the same time save the public considerable expense—that the post-office could, at less cost than the present companies, keep the telegraph open five or six hours a day longer than it now was, and thereby afford the public greater opportunities of sending messages than they now enjoyed; and, by reason of the post-office being able to work with one staff, with one set of wires, with one set of instruments, and with one central establishment instead of several, they would be able to effect an important reduction in the charges for messages throughout the whole of the United Kingdom. He did not claim for the post-office any superiority of management. He did not deny that the existing telegraph companies could obtain the services of the same class of men as that from which the *employés* of the post-office were now, and might be in future, drawn; but he did say that, by being able to work with one establishment, with one set of electricians, and with one set of wires, and by reason of their having in every little village of the country an office at which some one must remain stationed, throughout the day—he had no hesitation in saying they could do the work more effectually and more cheaply than any telegraph company could do, unless they incurred greater cost than they did at present. He would give a proof of this. They had heard of the failure of a company which set out with the intention of charging a low and uniform rate for messages throughout the United Kingdom. They had been told it failed because it could not do the work at that price. The truth was the company failed, not because it could not do the work at the price, but because there were two other companies, with more means and larger staffs, who, at the moment the rival company commenced at a low rate of charge, reduced their rates also; and because the public did not show its gratitude to the company who commenced the low rates, by giving their sole support to that company, it failed. But what was the rate they proposed? It was a uniform rate of one shilling for 20 words to any part of the kingdom. There had been a uniform rate of 10d. in Switzerland for many years, and that had produced a profit to the state. In Belgium also, a rate not exceeding one franc had produced a large profit to the state, so much so, that the government gave that profit back to the public by reducing the charge to half-a-franc. It might be said that the cost of the construction of the telegraphs was less abroad than it was in this country, and that, therefore, it was necessary to charge more here; but this was not the case. In Switzerland the cost of the telegraph per mile was, within a small sum, the same as it had been in the United Kingdom; but the rate per message from the commencement, in Switzerland, had been 10d. for 20 words, which had produced a profit. In Belgium, the cost of construction per mile, owing to the smaller extent of country and there being no submarine lines, had been less than in this country; the result was that with a 10d. rate they produced the large profit of 40 per cent. upon the whole capital, and they were now able to give that back in the shape of a reduction of the rate. That which had thus been done in Belgium and Switzerland it seemed to him might be done in the United Kingdom; and he said this without laying any claim to superior intelligence or good management on the part of the office with which he was connected. It had been suggested by one speaker that the surplus which was derived from the revenue of the post-office should be appropriated to meet any loss which might occur upon the telegraph enterprise. He did not imagine that the state would incur any loss whatever by taking the management of the telegraphs; but even if he thought it would, he would be the first to say that relief should be given to the taxpayers of the country from the present surplus. He had heard with surprise this evening the proposition that the surplus of the post-office revenue should be applied to the relief of the national taxpayer, as if it were not so already. He confessed he thought the national taxpayer did now get the benefit. His own opinion was that the surplus revenue from the post-office, which was growing every year, was a proper part of the national income; indeed he looked forward to the time when that surplus revenue would take the place of the whole of the present income-tax; and he thought all would much prefer to pay

the amount of the income-tax in postage than as now by direct taxation. If, as he supposed, the post-office, by undertaking the management of the telegraph, could not only give greater facilities to the public at a lower cost than that at which they could now obtain them, but at the same time could lay by something in aid of the national budget, would any one say that was not a great advantage? It was suggested that the privacy of the telegraph would not be so complete under the post-office management as it was now. He thought that was a misconception. If they were now considering for the first time the establishment of the telegraph and the transmission of open messages, it might be for them to consider whether they could find a sufficient number of trustworthy men and women to transmit these private messages; but if, while the companies employed precisely the same class as the post-office employed, there had not been a single breach of confidence, it was surely too late to hazard the proposition that the privacy secured under the existing companies would be lost when the work was transferred to the post-office. One of the speakers had said it would be desirable that the post-office should take the management of the telegraph, because it would lead to the extension of the system to all towns having a population of 5,000. He might say that if the scheme now before the government were carried out, he should be disappointed if towns with a population of 5,000 were to be the only places to derive the contemplated benefits. It was intended to go, without loss to the state, to much smaller populations than that, and he did not despair of seeing the time when, supposing the administration of the telegraph was handed over to the post-office, the lines would be as closely extended throughout the United Kingdom as they were at this moment throughout the whole of London.

Mr. Chadwick said, after the very complete and satisfactory answer which had been given by so high an authority in the postal service as Mr. Scudamore, there was little for him to add in reply to the remarks that had fallen from his friend Mr. Hawes. With respect to that gentleman's inquiry why the Government did not commence the telegraph system, and why it had been left to the trading community to do so, he would remark that the postal system itself, in its early origin in this country, was a system of all sorts of trading companies, who, in the language of olden time, "pestered, confused, and obstructed the service," to an extent that rendered it absolutely necessary that public responsibility should be brought to bear on its management. With respect to the possibility of doing anything, he thought the fact of a thing having been done was strong evidence of its possibility; and the fact of what he now advocated having been done in constitutional states like Belgium and Switzerland—to say nothing of despotic states—was sufficient evidence that the same course would be feasible in this country. He would go further and say that a government which could not do what was done in such states as he had mentioned—which could not perform duties like those which had so benefited the public elsewhere—was a government that certainly ought to be reformed. With respect to the "tapping" of the messages, resorted to by the Americans, that was an act which he hoped no one in the country would be guilty of, either under a private or public system of telegraphy. The Austrians, during the late war, tried to "tap" the messages of the Prussians, but they could make nothing of them, and they gave up the experiment, because the Prussian messages were sent in a system of cypher. This would be equally available for any private messages in this country. He was satisfied with the way in which the propositions he had put forward had been confirmed by the high authority they had heard that evening; and he ventured to hope that he should have the support of this Society in promoting an early adoption of the system.

The Chairman, in closing the discussion, said he would, in the first place, express his satisfaction that this Society should have thought this subject one which it was competent to take up. The ventilation of the question could not fail to do great good, and he thought, supported as Mr. Chadwick appeared to be by the majority of those who had spoken, it might be said that a step had been taken in effecting this important object. He confessed that all his own feelings were in favour of the suggestions which Mr. Chadwick had made; but he was not surprised that in this or in any other assembly there should be some little jealousy of government interference. There was doubtless much mis-management in many government departments, but it did happen that there was one department which stood out conspicuous for good management, and that was the post-office; so that he thought they would have no hesitation in committing the telegraph system of the country into the hands of that office, if it should be the decision of Parliament that it was right to do so. He should be sorry to find fault with the management of the existing companies. He believed they did all they could consistently with the interests of the shareholders, but the fact that they were only just beginning to pay a fair dividend must be a proof that they were not in a position to meet the wants of the public. So far as their lines were at present extended they did pretty well, but it became every day more important to extend the system, for we were coming to the time when we could not carry on even the retail trades of the country without the help of the telegraph. Those persons living in places not reached by the telegraph were almost excluded from the advantages of the commerce of the country. It was on their behalf, more especially, he was anxious to see originated some system which would give them the advantage of this rapid means of communication. He did not believe it was possible for the existing system to do that. The post-office was in a very different position. They had the machinery already provided which was needed for extending into the heart of every community the blessings of the electric telegraph system; and he hoped they would be enabled to do so. With these few remarks he begged to call upon the meeting to permit him, in their name, to tender their most cordial thanks to Mr. Chadwick for his interesting and very able paper.

The vote of thanks was then passed, and acknowledged.

Proceedings of Institutions.

Marlborough Reading and Mutual Improvement Society.—An entertainment in connexion with this Society was recently given at the Town-hall, Marlborough, by Mr. George Buckland, of the Polytechnic. The entertainment was entitled "Jest and Earnest."

PARIS UNIVERSAL EXHIBITION.

The preparations are going on with increased rapidity. On the French side the whole of the wood work is finished in many classes, and very little of the floor remains free. The portions devoted to other commissions have not so finished an air, as there is nowhere the same amount of enclosure and general arrangement as there is in the French part. Other countries evidently intend to follow the old plan of covered counters to a considerable extent, while glass cases, systematically grouped, are the general rule of the French commission.

The whole of the gallery to be appropriated to the history of art workmanship, the retrospective museum, is completed, and each entrance closed by solid doors; and the glass cases to contain the marvels of art of past times are being fixed in their places.

The fine art galleries are all ready for the pictures,

statues, and other works, so that this portion of the exhibition only awaits the arrival of the works themselves, which can be hung in their places in a few days. The French jury of admission has exercised a very rigorous judgment, the number of pictures admitted being less than six hundred.

As in the industrial portion of the exhibition, so in the picture gallery and retrospective museum, the English commission has adopted different colouring from that of the rest of the exhibition, namely, a flat olive tint in place of a dull red; and the opinion of artists seems in favour of the change. The objectionable false ceiling, too, has disappeared, and has been replaced by a semi-transparent fabric, which stretches over the entire opening between the coverings of the roof. On dull days the galleries look rather sombre, but the English division will possess the incontestable advantage over all the others placed in the curved portions of the building, namely, that the light will fall nearly equally on all parts, and, moreover, that drawings placed on screens along the centre of the floor, if the amount of space demand such an arrangement, would be nearly as well lighted as the pictures on the walls.

The specimen of English domestic architecture in the park attracts great attention, the bold-pitched roof and gables, the exhibition of the timber work on the surface, the covering of tiles of variegated form and colour, from black to light-red, and, more than all, the stacks of ornamental chimneys, constructed with moulded and cut bricks of various tints, which, like the tiles, are of English manufacture, induce numerous inquiries as to the country of which the style is native. It still goes by the name of the Queen of England's Pavilion, although it does not appear that it is destined to any such application, but is to contain specimens of various apparatus and arrangements for the warming and ventilation of buildings. Another surprise of the same kind is reserved for our friends abroad in the form of a bay of the new South Kensington Museum, the materials for which are now being prepared under the superintendence of the son of the architect, the late Captain Fowke; this specimen structure will be of large dimensions, about sixty feet in height, and of nearly the same width, and will certainly convey a good notion of our working in brick and terra-cotta, and, it is to be hoped, of our architectural taste also.

In the English department of the machinery gallery a steam crane, sent by Messrs. Shanks, of Arbroath, is mounted upon the service rails, and doing capital work. Two other steam machines are now to be seen standing in inglorious idleness in one of the main roads of the park; these are traction engines, of 6 and 12 h.p., built by Messrs. Aveling and Porter, of Rochester. They stand idly at present under the Union Jack, which now flies bravely in the park, but it is more than probable that their aid will be gladly called in before long.

Amongst foreign departments within the building, Sweden and Norway, Morocco and Tunis, have lately shown great activity; the first-named, like its neighbour Russia, is fitting up its court with characteristic wood-work, and, although heavy, it has an architectural air, and will attract attention.

The courts of Morocco and Tunis are already blazing in gold and colours, as characteristic, and to us as novel, as the decorations of their neighbours—Turkey, Egypt, and the Danubian Principalities; the whole together forming a remarkable contrast with the chaste, solid wood-work of the Russian court close at hand.

The garden enclosed by the building will very shortly be in perfect order, four large oblong basins, in which fountains will play, are in various stages of forwardness, and the flower-beds and gravel walks are being prepared. On the walls of this inner garden, as well as on the outer edge of the building towards the park, the names of the various exhibiting countries will appear in conspicuous characters over the doors of the avenues leading to their several departments. This will be found very useful, for strangers are greatly perplexed by the curvilinear form of the building.

The number of persons now engaged in preparations for the exhibition is very considerable, and as many as seven thousand people have paid for admission as visitors in a single day; some of the places of refreshment have, therefore, been already opened. Most of the cafés and restaurants on the French side are nearly ready, and the English and some others will not be long behindhand; one of the former has already had its prices inscribed over its door, and it may be satisfactory to mention that they are not very much higher than those which are charged by the same establishment in the Palais Royal. There seems every promise of abundant means of refreshment at prices more moderate than usual under similar circumstances.

In the park the structure now erecting for the Imperial Commissaire-Général begins to present an imposing appearance; it is composed of solid oak framing, put together in divisions before being mounted on a rusticated basement of artificial stone—*Béton aggloméré*. It will form a pleasing pendant to the English house mentioned above, especially as both belong to the same period, or nearly so. Just behind the offices of the commission and juries, a building of considerable size is being prepared for the service of the post-office and telegraph; these are very conveniently situated, but there will also be what may be called district offices attached to the international club at the opposite side of the park.

Amongst the new buildings is one of considerable size, in which the models and plans of the works of the Isthmus of Suez Company are to be exhibited.

The Sultan's mosque and the three buildings of the Viceroy of Egypt now make a most imposing appearance. The mosque is peculiarly graceful, with its well-proportioned cupola and taper minaret, around which workmen have just fixed the gallery from which the muezzin reminds the faithful of the hour for devotion. The porticos, doors, and windows are ornamented with arabesque work, somewhat resembling that of the Alhambra, but it does not appear that it will be coloured. Two of the Viceroy's buildings are decorated in similar style, while the third, the great temple, in the style of the epoch of the Pharoahs, is being covered within and without with the well-known emblems of the period, and with copies of ancient mural paintings in brilliant hues. For a temporary purpose this temple is a marvellous structure. The fellah's house is nearly finished.

The pavilion of the Bey of Tunis, not far removed from the Turkish and Egyptian group, is a very large building, three stories in height, with a façade capped by two small cupolas, the entrance to which is by means of a bold double flight of steps, in the form of a horse-shoe. This, like two of the Viceroy's buildings, is to contain a series of illustrations of the habits, manners and arts of the country which it represents.

The horticultural garden, perhaps, exhibits progress more than any other part of the Exhibition grounds; the iron framework of the glass-houses is nearly all in place, the two aquariums are approaching completion, the lakes and canal are finished, the flower-beds and gravel-paths are nearly all formed, and masses of shrubs are being planted.

It is well to mention that the boilers which are to supply the British section with steam will soon be ready; Messrs. Galloway's three 40 h.p. conical tubular boilers are set, and places are being prepared for one of Messrs. Hayward and Tyler's vertical tubular boilers, and for a "safety tubular boiler," by Messrs. Howard, of Bedford, each of 30 h.p.; a sixth boiler will complete the series.

Everything seems in a fair state of preparation, the only legitimate cause of uneasiness being the bringing to the Champ de Mars of the enormous mass of machinery and goods which are to furnish the Exhibition; in this case the old adage of "first come first served" is one

which every one should not only bear in mind, but act upon with the utmost possible dispatch, if he desires to be in good time.

SPECIAL EDUCATION IN FRANCE.

M. Duruy, the Minister of Public Instruction, continues his efforts to raise the intellectual position of the people of France with unabated zeal and success. Not long since the Minister passed a day at the new establishment for special education at Cluny, and examined all the details of the school and college attached, as well as the works of the pupils, in order to judge of the effect of the new system, and to see what improvements might be introduced into it. The result of the investigation is reported as highly satisfactory. The sympathy existing between the pupils and their instructors is said to be remarkable, and punishment almost unknown. In the case of the normal pupils, there have been no cases of complaint whatever; and during the month of January not a single boy in the junior school was punished, while in December only one was confined to school for half-an-hour.

The establishment already numbers one hundred pupil teachers, and ninety boys in the college; and it already possesses the nucleus of a magnificent practical museum. M. Duruy invited manufacturers and others to contribute towards the collection, and his invitation was admirably responded to by the great iron-masters, coal-owners, engineers, metal-workers, spinners and weavers of all kinds of materials and fabrics, glass, chemical, china, pottery, paper, leather, glue, brick, chocolate, piano, furniture, and other manufacturers. To the donations of these gentlemen have been added fine collections from the Imperial factories, the department of the woods and forests, and other public establishments, the faculties of sciences of Paris and the departments, the Museum of Natural History, and the government of Algeria.

A considerable number of books on science and the Arts have been presented to the library of the college. The department of the Saône-et-Loire, in which Cluny is situated, subscribes £3,200 a-year towards the maintenance of the establishment.

The salaries of the director and professors have been fixed by the Minister, as follows:—Director, from 6,000 to 8,000 francs; professors, of first class, 4,000 francs, second class, 3,500 francs, and third class, 3,000 francs. The salaries of the curators range from 1,200 to 1,800 francs per annum.

The school and college were opened on 1st of November, and the total number of pupils, including those not resident, amounted at the opening to 218.

The Minister was met upon the occasion of his visit by the authorities of the town and department, the rector of Lyons, and several educational inspectors, and by a gentleman from Canada, whose name is not given, but who is described as superintendent of public instruction in Canada; and after the inspection the Minister, the visitors, professors, and the whole of the pupils, both of the normal school and junior college, sat down to a collation, towards which fifty pheasants were sent from the Imperial preserves.

M. Girardin, Dean of the Faculty of Lille, has accepted a professorship of agriculture and rural economy in the Lycée of that town.

The Imperial Society of Agriculture has conferred a medal on M. Wagner, controller of the normal school of Strasbourg, for the aid which he has given to the teaching of agriculture and horticulture in the public schools of France.

A society has recently been formed in the Department of the Eure and Loire, which has for its object the development of popular instruction of all kinds, by assisting poor communes with funds, remunerating teachers, or forming public libraries.

Generally it may be said that all the world in France is impressed with the enormous importance of public instruction, and that the efforts to give to every youth not only general but professional education are constant and enlightened.

Fine Arts.

Civil Service. — Supplementary Estimates. — An additional sum of £905 is required in respect of the designs now on exhibition at Westminster, for the enlargement or rebuilding of the National Gallery. Each architect receives for his plans, &c., £200, and a sum of £105 has also been awarded to the surveyor for assisting the committee of judges. Furthermore, Messrs. Banks and Barry have received £1,575 in respect of the designs on the site of Burlington House, which had to be abandoned when Parliament determined that the National Gallery should remain in Trafalgar-square. Six hundred pounds has been voted to Mr. Cope, as additional remuneration for the frescoes painted by him in the Peers' corridor. It will be remembered that a commission was appointed to revise the payments which had been made to the painters employed in the decoration of the Houses of Parliament; and in consideration of the greater time and labour involved than had been anticipated, and of the higher prices which artists now gain than formerly for their works, it was recommended that Mr. Cope, among others interested, should receive further remuneration. For eight frescoes Mr. Cope was, under the original contract, to be rewarded at the rate of £600 each, or £4,800 for all. It is now agreed that he shall be paid an additional £100 on each work, which will make a total of £5,600 or £700 a-piece. Some of the artists concerned are not yet quite content. These supplementary estimates also include an item of £817 for the completion of the monument to Sir John Franklin; likewise the further sum of £50,000 required to meet payments to be made in the year ending March 31, 1867, for expenses in the British Department of the Universal Exhibition at Paris.

Wellington Monument, St. Paul's.—The public will be happy to learn that this model, about which, owing to delays, much discussion has taken place, is now so far completed, that the execution of the monument itself may properly be commenced. It is proposed now to advance to the sculptor, Mr. Stevens, one-fifth of his commission, viz., £2,800, in addition to the one-third already paid.

Exhibition of Historical Portraits in Paris.—The Pompeian house built for Prince Napoleon in the Avenue Montaigne, has passed into the hands of M. Arsène Houssaye, the well-known author and editor of the *Artiste*, who is now engaged in preparing an exhibition of portraits. It is said that the project has been well received, and that the collection is likely to be a highly interesting one, including many fine and curious works, especially of the revolutionary period. M. Arsène Houssaye's position in the administrative department of the Beaux Arts, and his reputation as an art critic, give him peculiar advantages for such an undertaking.

Election of Art-Juries in France.—The minister of the Beaux Arts has just issued the regulations respecting the jury for the admission of works of art and the awarding of prizes for the annual exhibition of the works of living artists in Paris this year. The principle of the election of a portion of the members of the juries by the decorated and medalled artists is maintained, but the proportions are somewhat changed. Last year three-fourths of the jurors were elected by the artists, and only one-fourth by the administration; according to the new regulations two-thirds are to be elected by the artists, and one-third by the department. The number of jurors is also considerably reduced. In the section of painting and drawing there are to be but fifteen mem-

bers in place of twenty-four; in sculpture, nine instead of twelve; in architecture, six in place of eight; and in that of engraving and lithography, six instead of eight. Three supplementary members are to be named in each section to fill up vacancies, two to be taken from the the artists' lists, and one to be appointed by the administration. It was feared that the Universal Exhibition would take away from the interest of the Salon this year, but the contrary is now the impression; the space allotted to the fine arts is so restricted in the building in the Champ de Mars—there is not room for more than seven hundred pictures—and the preparations for the year of the exhibition are so large, that the Salon, it is now believed, will be unusually brilliant. In connection with this subject, it may also be mentioned that the artistic season, which usually finishes with the first ray of the summer season, is expected to be prolonged this year to a much later period, and the list of coming sales of works of art is unusually long and important. This might have been predicted from the attractions held out to the amateurs and connoisseurs of all nations to visit Paris this year.

Commerce.

Asphalte.—The discovery and use of asphalte may be traced back to the most remote periods, and numerous vestiges of its employment may be found in the ruins in Egypt and Babylon. It seems then to have fallen into disuse, as no traces of it are found in the gigantic works of the Romans; and it does not appear to have been in use until the beginning of the 18th century, when a vein of asphalte was discovered by a Greek professor, named Eyrini, in the course of a geological excursion in the Val-Travers, Neuchatel; experiments were made by him on its nature, and it was found to be a calcareous substance impregnated with bitumen, and yielding, by heat, a mastic of the same quality as the Babylonian cement. Enchanted by his discovery, Doctor Eyrini, in 1721, published a pamphlet, in which he very much exaggerates the value of asphalte, even stating that it was used in the construction of the Assyrian and Egyptian monuments, totally forgetting that this substance, melting at so low a temperature, could only be used in those latitudes for the foundations, or for those parts sheltered from the sun's rays. In his pamphlet notice is also taken of its being adapted for various purposes for which it is now used, but no mention is made of the use to which it is now applied, and to which it owes its great success, namely, foot pavements. Europe was entirely supplied with asphalte from the Val-Travers until the discovery of it at Seyssel, the working of which has been a most fluctuating speculation. In less than a year £20 shares went up to above £640, and afterwards fell to £1. This had a bad effect for the time on the use of asphalte, which in 1838 began to be employed for the construction of foot pavements in Paris; but now this industry has regained its standing. The municipality of Paris uses it exclusively for the construction of footpaths, and it is rapidly replacing, on a large scale, macadam in the construction of streets.

Colonies.

Australian Leeches.—A Melbourne journal says that this branch of trade has grown to pretty extensive proportions, both as to the number collected and the distances to which they are forwarded. The trade is principally carried on in connexion with the operations of the Murray River Fishing Company, the fishermen employed by the company turning their attention at seasons unfavourable to the fishery to the collection of leeches. From 150,000 to 250,000 leeches are sometimes collected in one of the trips of the company's steamer. They are then packed and conveyed to Melbourne, where a large proportion of them are put up for transmission abroad. Large numbers of them are sent to London and Paris, where, it is stated, they are preferred to leeches brought from any other place; but the principal outlet for the export is America, where the demand is always great, from the absence or rarity of the proper kind of leech throughout the whole of that great continent. The shipments of the company are made to San Francisco, Panama, and New York, whence they become distributed in all directions. The export from this colony appears likely to be a remunerative business for some years. The company referred to anticipates that from two to three millions of leeches will pass through their hands this season.

The Intercolonial Exhibition.—It is calculated that the number of exhibitors at the Intercolonial Exhibition at Melbourne will be as follows:—

Queensland exhibitors	41
New Zealand	56
New Caledonian	42
South Australian. (This includes very many exhibits by few exhibitors.)	80
West Australia	196
New South Wales	272
Tasmania	637
Victoria (fine arts, 200; others, 1837)	2,037
Total	3,361

Distress in New South Wales.—The latest accounts speak of a marked improvement in the condition of the working population of this colony, a large portion of which was lately in very distressed circumstances. The discovery of rich gold-fields at the Widdin Mountains has given a means of livelihood to some thousands of persons that were sorely in need of aid, and the demand for labour has been considerably enhanced. In some parts of the country the squatters have found it difficult to obtain shearers, and the farmers have been seriously inconvenienced for want of reapers. The committee appointed to inquire into the distress in Sydney, state that much distress is owing to large numbers of skilled and unskilled labourers being unable to obtain employment, and, for the relief of this state of things, they actually propose to check importations, with a view to "encourage native industry." They recommended "that an Act should be passed to impose a duty of 20 per cent., *ad valorem*, on all timber except in log, on furniture, carriages, shoes, saddlery, harness, and all apparel and slops imported after July 1, 1867."

Obituary.

Thomas Martin, F.R.C.S., died at Reigate, on the 12th of February, in the 88th year of his age. He was born at Pulborough, in Sussex, November 3rd, 1779, and was the eldest son of Peter Martin. His father, who was descended from good English and Scotch families on the male and female side respectively, emigrated from Edinburgh when the events of the '45 were still fresh in memory, and settled himself at Pulborough as a general practitioner. At 15 years of age, Thomas Martin became a volunteer in the Petworth corps of yeomanry, and after serving for two years, he proceeded, on October 1st, 1796, as a student to the then united hospitals of Guy's and St. Thomas's. Cline was at that time lecturing on anatomy, with Astley Cooper as his assistant and demonstrator; Fordyce was teaching to large classes the practice of medicine, materia medica, and chemistry; Haighton was inculcating the principles of midwifery and physiology; while amongst the surgeons were "old Lucas" and Cooper, the uncle of Sir Astley. After completing his studies, he went down to Tunbridge Wells to take charge of the practice of Mr.

Prince, of that place, during his illness. Mr. Martin was early initiated in the difficulties and responsibilities of private practice; with the self reliance thence arising, he finally settled in practice at Reigate, on February 19th, 1800, marrying a few years later the daughter of Mr. Thomas Charrington. In 1812, having always had a fondness for societies and a strong feeling in favour of the principle of association, especially for men engaged in the same profession, he was one of the most zealous and active of those associated apothecaries and surgeon-apothecaries who commenced proceedings, under the leadership of Dr. Mann Burrows, with a view to improved medical legislation. In the same year he founded the Surrey Medical Benevolent Society, which has grown continuously in prosperity. Mr. Martin took an active part in the establishment of the Provincial Medical and Surgical Association at Worcester. He suggested the formation of the south-eastern branch of the association, which, under the fostering care of himself at first, and, later, of his son, Mr. P. Martin, attained its present flourishing and influential position. He established a journal for the better enunciation of the views of the association. In 1830, Mr. Martin suggested the establishment of a mechanics' institute, after the manner of Dr. Birkbeck, to give rational evening employment and recreation to the people in his neighbourhood. The society so formed has grown into increased importance, and has lately given off an offshoot, the "Working Men's Institute." Mr. Martin was one of the first to assist in establishing a Cottage Gardener's Society. He also established some years ago a Surrey Church of England Schoolmasters' and Schoolmistresses' Association. A savings' bank for adults and a penny savings' bank for children had also a share of Mr. Martin's attention. Mr. Martin took an active and liberal part in building new churches and establishing national schools in the parish of Reigate. His energy of body as well as mind was great. It was no uncommon feat with him in his earlier years (when railroads were not, and the byeways of the Reigate neighbourhood were horse knee-deep in mud), after getting through a hard day's work in the saddle, to ride to London (twenty miles), hear an oratorio, ride home the next morning to a breakfast of the simplest kind, repeat his daily round, and return to the plainest dinner, of which any kind of stimulant by exception only formed a part. Nor was it merely in animal power that he showed himself so supreme; like his father before him, he was "the old student" to the end of his days. At an age when most men, when they read at all, read merely for amusement, he was not satisfied with anything short of instruction. With the decision of a man who "knew the good and did it," he united the mildness and the courtesy of a Christian gentleman. With the tact and delicacy of a courtier, he still preserved a perfect singleness of heart; and known here—but how imperfectly known save by a very few—for his self-denying liberality, his character was adorned by that greatest gift of all, which is "charity." He was elected a member of the Society of Arts in 1852, and took a deep interest in the Society's proceedings, especially in that portion of them which related to the Union of Institutions and the examinations connected with them.

Sir George Smart, the well-known musical professor, died on Saturday, February 23rd, after a short illness. He was born in London, in May, 1776, and for more than half a century was at the head of the musical profession in the metropolis, acting as conductor of the leading concerts in town and country. He was director of the Lenten Oratorios from 1813 down to the period when the Sacred Harmonic Society was started, when the performances of sacred music in Drury-lane and Covent-garden Theatres were given up. He was conductor of the festival in Westminster Abbey, in 1834. He directed the music at the coronations of William IV. and Queen Victoria, and was organist and composer to the Chapel Royal, St. James's, for many years. Sir George was one of the original founders and members of the Philharmonic Society, in 1813. In 1836 he, at the Liverpool Festival, introduced, for the first time in this country, Mendelssohn's oratorio "St. Paul." The Duke of Richmond, Lord-Lieutenant of Ireland, knighted Sir George in 1811, at Dublin. He was the musical director at Covent-garden Theatre in the Kemble days, when he went to Germany to engage Weber to produce "Oberon." The last-named composer died in the house of Sir George, then residing at 91, Great Portland-street, on the 4th of June, 1826. The career of Sir George was one of the longest ever enjoyed by artist. As a professor of the pianoforte, but much more as a singing master, he had an immense *clientèle*, and he gave lessons until he was long past 80 years of age, and the majority of singers, native and foreign, destined for sacred singing, took lessons of him, amongst whom the names of Jenny Lind and Sontag may be recorded. He was a life member of the Society of Arts, having been elected in 1816, and was a member of the Musical Pitch Committee, appointed by the Council in 1859.

Notes.

Steam Ferry Across Lake Constance.—A plan has been proposed for carrying railway trains across Lake Constance by a steam ferry. According to the plans submitted, 14 to 16 carriages are to be sent on a steam ferry, constructed for the purpose, and furnished with rails; the steam ferry to be 200-horse power. An ingenious mechanical arrangement is adopted for meeting the variation of the level of the water, and thus facilitating the embarcation of the carriages. The estimate of the cost is said to be moderate. The negotiations to carry out this project are already begun with the managers of the Wurtemberg and Bavarian railway.

Correspondence.

The Water Question.—Sir,—In reading your notice of a pamphlet on this subject by Mr. Bailey Denton, I could not but feel surprise that an engineer of such eminence should entirely overlook his own undeniable statements,—"that rivers form the natural drainage of the country through which they flow, and that all waste and sewage must inevitably find their way to them in some shape or other." The great object to be attained, and to which no allusion is made by Mr. Denton, in the quotations which appeared in the *Journal*, is, therefore, to clear our rivers of all impediments in their course to the sea; that is to say, to remove and clear away all dams, weirs, and other obstructions, of whatever kind, which have been placed or constructed from time to time for the use of inland navigation, mills, waterworks, or other purposes. Two advantages, of great national importance, would be derived from such a clearance. First, we should hear very little of the pollution of rivers, which would then have a clear course to the sea in deep beds; and, secondly, the recurrence of disastrous floods and inundations would, in a great measure, be prevented, and there would be a considerable diminution of the banks and shoals which infest the mouths of all our rivers, both large and small, at their exit into the sea. In order to render evident the impropriety of artificial obstructions to the free course of a river to the sea, I will suppose that wherever was found a few inches fall in the great drainage system, now being carried out for the benefit of the metropolis, a dam or weir should be interposed, when the consequence would be that the result of the drainage would be *nil*. It is the same with our rivers, and we are daily witnessing the direful consequences of such a practice. It will be objected that the cost of a wholesale clearance of our rivers would be

enormous, but hardly greater than the estimate of Mr. Denton, which would ultimately be found to be about one-tenth of the real cost, and with little prospect of effectual relief; more especially as the great sacrifice of property from disastrous floods must be placed against the cost of clearance, which would, in a great measure, prevent their recurrence. Inland navigation may now be considered nearly defunct, as it does not produce sufficient revenue to keep the locks and weirs in repair, and these are now in a universal state of rottenness. Indeed, there have been intimations that the canal proprietors, or commissioners, are intending to apply for a parliamentary grant for that purpose, so there can be no great amount of compensation required for the destruction of such worthless property. In regard to mill property the case is somewhat different, but owing to the destruction of our rivers by dams and weirs most water millers have adopted the steam-engine as an auxiliary, which, in many cases, has actually superseded the water-mill. Steam is much more economically applied than formerly, and will be much more so in the future, so that, considering the advantage of situation, the total abandonment of water power, so useful in the early dawn of civilization, will cause no very great sacrifice of commercial interests. Moreover, the statistics of loss of property by floods and inundations would show an amount more than sufficient to cover the clearance of our rivers, let alone other concomitant advantages. The proposal to make reservoirs to hold the flood waters to be returned to the river, would, in my opinion, only increase the evil tenfold. The true and only plan to diminish such disasters, is to endeavour to add to the scouring power of the river current, and by that means to deepen the bed,—an operation quite out of our power to accomplish by mechanical means alone. The fact is indubitable that both running and standing water, if not incessantly supplied with ordure, has a strong tendency to purify itself, and that independently of the great consumption of organic matters, and other impurities, by animal life, and aquatic vegetation. So that half a mile above any town or village, under such conditions, river water may be used with perfect freedom from disease, and London might be supplied with pure water to any amount at small cost. Thames water, as supplied to shipping, in three or four weeks becomes as black as ink, and emits a poisonous smell, but when the cask has stood for a week or two with the bung out the water becomes perfectly limpid and sweet. I have had personal experience of this fact in some of my early voyages, when wooden casks only were used. Mr. Denton, in the course of the remarks quoted, alludes to the river Kennet, the waters of which that gentleman supposes to be drinkable, but which are as foul above the town of Reading as the Thames ever was; and after passing through the town, and receiving the contents of some thousands of water-closets, sinks, and cespools, it cannot be much sweeter when it joins the Thames, a little below the town. The new Reading Water Company make a pretence of filtering, but when the freshets come down, their filtered water is turbid; and at all times the filter is so badly arranged, that though the Kennet water is perfectly soft, after passing the filter it becomes so hard as to require a lump of soda to enable you to wash your hands with soap. The old Waterworks of Reading still supply all the water unfiltered for flushing, watering the streets, and for the railway works at a very low rate. As a further proof, if necessary, of the hardness of the water supplied by the Reading Company, I need only add that our kettles are quickly coated with successive layers of carbonates, each more than a sixteenth thick, not strongly adhering to each other. The scales are continually breaking off, and cause the boiled water to be always in a turbid state; yet the Reading Company are in possession of certificates from London analytical chemists, of the perfect softness of the water supplied by them to the consumer.—I am, &c., Henry W. Reveley.

Reading, Feb. 18.

Water Supply.—Sir,—In your report of my remarks made in the discussion on Mr. Beggs's paper an error has occurred. My concluding observation was to the effect that having been a member of the Corporation of the city of Salisbury, of the Board of Health, and also a vestryman in each of the parishes where my property is situated, I was of opinion that if the supply must be through either, I greatly prefered its administration being in the hands of municipal institutions rather than in those of vestries. I believe the very different results in the analyses of the water supply arise from some specimens being taken at the in-flow to the cistern, and others at the out-flow. I hold that every cistern, even in our best-arranged houses, should be drawn off—*i.e.* emptied—at least twice a year, and well cleansed, and if this is absolutely necessary in them, how much more so in those so graphically and truthfully described by Mr. Beggs, where old tubs, dilapidated cisterns, &c., are the only receptacles for the daily supply.—I am, &c., W. Botly.

MEETINGS FOR THE ENSUING WEEK.

Mon.....Entomological, 7.
Odontological, 8.
Farmers' Club, 5½. Rev. E. Smithies, "Emigration: What to do, and where to go."
British Architects, 8.
Medical, 7. Annual Election.
Asiatic, 3.
Victoria Inst., 8.
London Inst., 7. Mr. Macfarren, "On the Origin and Development of the Lyrical Drama."
Royal Inst., 2. General Monthly Meeting.
R. United Service Inst., 8½. Staff-Commander H. A. Moriarty, C.B., R.N., "The Atlantic Telegraph Cables of 1857-58; also those of 1865-66."
Society of Engineers, 7½. Mr. John J. Horner, "On certain methods of applying Screw Piles in the construction of a Wrought Iron Girder Bridge at Verona."
Society of Arts. Cantor Lectures. Mr. Hullah, "On Music and Musical Instruments." Lecture I., Harmony.

Tues ...Royal Inst., 3. Rev. G. Henslow, "On Botany."
R. United Service Inst., 8½. Adjourned Discussion on Mr. James Reddie's paper, "On Manning the Navy."
Civil Engineers, 8. Captain H. W. Tyler, "On the Working of Steep Gradients and Sharp Curves on Railways."
Pathological, 8.
Ethnological, 8.
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Wed ...Society of Arts, 8. Discussion, introduced by Mr. Christopher Cooke, "On Storm Signals and Forecasts, their utility and public importance with respect to Navigation and Commerce."
Geological, 8. 1. Rt. Hon. the Earl of Selkirk, "On ancient Sea-marks on the coast of Sweden." 2. The Duke of Argyll, "On a Palæozoic Fossil found near Inverary, and on a post-tertiary Lignite Bed in the district of Kintyre." 3. Mr. W. S. Shea, "Report on recent discoveries of Gold in New Brunswick." 4. Mr. W. Wheelwright, "On the discovery of Coal on the Western Slope of the Andes." 5. Rev. P. B. Brodie, "On the presence of the Purbeck Beds at Brill, Buckinghamshire."
Pharmaceutical, 8.
Obstetrical, 8.

Thur ...Royal, 8½.
Antiquaries, 8½.
Linnæan, 8. 1. Mr. J. P. M. Weale, "On the Structure and Fertilisation of the genus *Bonatea*, with a description of a species found at Bedford, S. Africa." 2. Description of *Musci* collected by the Rev. T. Powell in the Navigator's Islands."
Chemical, 8.
R. Society Club, 6.
Artists and Amateurs, 8.
Royal Inst., 3. Prof. Frankland, "On Coal Gas."

Fri .....Medical, 5. Anniversary Oration.
Astronomical, 8.
Royal Inst., 8. Rev. W. Greenwell, "On the Yorkshire Wold Tumuli."

Sat .....R. Inst. Prof. Frankland, "On Coal Gas."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb. *Delivered on 16th February*, 1867.

17. Bills—Industrial Schools (Ireland) (corrected copy).
18. ,, Trades' Unions (corrected copy).
21. ,, Association of Workmen.
22. ,, Vice President of the Board of Trade.

24. ,, Capital Punishments within Prisons.
25. ,, Murder Law Amendment.
5. Irish Reproductive Loan Fund—Account.
12. Burghs (Scotland)—Returns.
39. West India Islands, &c., Relief—Account.
British North American Provinces—Letter (Part II.).
Public Petitions—First Report.

Delivered on 18th February, 1867.

26. Bill—Execution of Deeds.
7. National Gallery—Report.
29. Navy—Statement of Savings and Deficiencies.
44. Metropolis (Union and Parochial Expenditure, &c.)—Return.
55. Ecclesiastical Commission—Account.

Delivered on 19th February, 1867.

23. Bill—Military at Elections (Ireland).
1. Public Income and Expenditure—Account.
30. Naval Receipt and Expenditure—Account.
45. Bank of England—Account.

Delivered on 20th February, 1867.

20. Bills—Railway Debenture Holders.
31. ,, Land Tax Commissioners' Names.
56. Army Estimates (1867-68).
Public Petitions—Second Report.

Delivered on 21st February, 1867.

27. Bills—Spiritual Destitution.
33. ,, Mines, &c., Assessment.
35. ,, Habeas Corpus Suspension (Ireland) Act Continuance.
36. ,, Duty on Dogs.
37. ,, Sugar Duties.
48. East India (Revenues)—Return.
49. East India (Loan)—Return.
63. Army (Colonies)—Statement.
64. Army (Variation of Numbers, &c.)—Statement.
65. Military Reserve Funds—Account.

Delivered on 22nd February, 1867.

12. Bills—Valuation of Property.
15. ,, Church Rates Commutation.
40. ,, Marriages (Odessa).
41. ,, Criminal Lunatics.
25. Russian Dutch Loan—Account.
38. Naval Savings Bank Act (1866)—Order in Council.
47. Board of Trade—Correspondence.
50. Workhouses (Metropolis), Part I.—Return.
50. (1.) Workhouses (Metropolis), Part II.—Return.
52. Royal Irish Academy—Letter.
54. Bank of England—Applications.
59. Army (Roman Catholics)—Return.
62. Coal Mines (Accidents and Explosions)—Circular Letter.
70. Duchy of Cornwall—Account.
Great Yarmouth Borough Election—Report of Commissioners.

Delivered on 23rd February, 1867.

29. Bills—Tenants' Improvements (Ireland).
30. ,, Land Improvement and Leasing (Ireland).
23. Sardinian Loan—Account.
24. Greek Loan—Account.
57. Navy Estimates.
66. Army (Manufacturing Establishments)—Return.
Sugar Refining—Declaration.
Reigate Borough Election—Report of Commissioners.

Patents.

From Commissioners of Patents' Journal, February 22nd.

Grants of Provisional Protection.

Agricultural fecundating agent—279—O. Monnet-Laverpilière.
Aniline, &c., producing colours from—242—E. de Nève.
Artificial fuel—309—S. Plant and W. Tatton.
Athletic exercises, apparatus in—339—W. Prangley.
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Lamps—253—L. C. F. Clerc.
Lime kilns—259—W. Lee.
Liquids in cans, &c., securing—335—W. Rigg.
Malt kilns, &c., heating—249—T. Prideaux.
Mattresses—281—E. Walton.
Metallic cases for preserved food—321—J. H. Johnson.
Metals from their ores, obtaining—285—W. E. Newton.
Metals, rolling, &c.—196—W. Gray.
Ores of lead, treating—325—J. Wright and T. Cobley.
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Taps—291—A. Bradshaw.
Trousers—3437—T. W. Couldery.
Tramways, &c.—232—J. Haworth.
Wash-basins—147—R. Harlow.
Water-closets—214—E. Lichtenstadt.
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Weaving, looms for—236—W. Dickinson.
Window sashes, &c.—273—T. Bullivant.
Wool, cleansing—257—C. E. Brooman.

Patents Sealed.

2166. T. Allen.
2167. E. Rimmel.
2177. J. T. Poyser.
2184. E. Green.
2185. W. L. Owen.
2186. C. Richardson.
2188. G. Little.
2193. S. Plimsoll.
2195. J. F. M. Pollock.
2205. W. Krutzsch.
2206. T. Davis.
2218. R. Irvine.
2224. E. T. Hughes.
2346. T. Wheelhouse.
2416. A. B. Walker.
2426. W. Clark.
2490. A. F. Johnson and M. P. Griffin.
3304. W. E. Newton.
3368. J. Howard.

From Commissioners of Patents' Journal, February 26th.

Patents Sealed.

2210. W. Gould.
2212. R. Buckton.
2213. J. Foster, jun.
2226. J. Richards and R. Grindle.
2227. T. Turner, jun., and W. Siddons, jun.
2232. J. Loebl and I. Pick.
2236. J. M. Mellor.
2238. T. Gall.
2239. R. Daglish.
2240. J. H. Johnson.
2246. J. Owens.
2254. J. Baker.
2256. A. W. Hosking.
2258. M. Knowles.
2259. D. Caddick.
2266. C. E. Brooman.
2274. J. B. Brown.
2290. W. Selby.
2299. J. H. Johnson.
2448. T. Whitaker and J. Contantine.
2466. A. V. Newton.
2496. A. V. Newton.
2523. R. Hornsby & J. E. Phillips.
2562. J. Ferrabee.
2688. J. Miller.
2772. A. Turner.
3106. W. E. Newton.
3352. T. Whitby.
3355. A. V. Newton.
3430. A. B. Ely.

Patents on which the Stamp Duty of £50 has been Paid.

480. C. Hull.
503. J. W. Swan.
561. W. Dangerfield.
470. T. Rowatt, jun., and A. Lighbody.
475. W. E. Newton.
542. W. Ibotson.
728. F. L. Roux.

Patent on which the Stamp Duty of £100 has been Paid.

522. G. Jenkins.

Journal of the Society of Arts.

FRIDAY, MARCH 8, 1867.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'Clock :—

March 13.—"On the Tinnevelly Pearl Fisheries." By Clements R. Markham, Esq.

March 20.—"On Successful Oyster Culture." By Harry Lobb, Esq.

Cantor Lectures.

A Course of Lectures "On Music and Musical Instruments," by John Hullah, Esq., is now being delivered as follows :—

Lecture II.—Monday, March 11.

Melody.—Musical System—Tonality, Ancient and Modern—The Subdominant and Leading Note—Melodies in Imperfect Scales and in Ancient Modes.

Lecture III.—Monday, March 18.

Musical Expression. — Definition — Difficulties of Musical Composition—Realization of Unheard Effects —The Perfect Cadence—The Renaissance—Imitation—Expression, False and True.

Lecture IV.—Monday, March 25.

Musical Notation.—Different Systems, Alphabetical and Special—Neumas—Accents—Lines and Spaces —The Time Table—Modern Notation; its Origin and Growth, Simplicity and Fitness.

Lecture V.—Monday, April 1.

Musical Instruments.—Classification—Wind Instruments—Stringed Instruments—The Plectrum, Hammer, and Bow—Instruments of the Ancients — Mediæval Instruments; their Introduction into the Church.

Lecture VI.—Monday, April 8.

Musical Instruments (*continued*).—Modern Instruments—Chamber and Orchestral—Combination — The Modern Orchestra—Conclusion.

The lectures commence each evening at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend to each lecture. A set of tickets for this purpose has been sent to each member.

Examinations, 1867.

In addition to the prizes announced in the Programme of Examinations, the following are offered :—

The Worshipful Company of Coach and Coach Harness Makers offer a prize of £3 in Freehand Drawing, and a prize of £2 in Practical Mechanics, to the candidates who, being employed in the coachmaking trade, obtain the highest number of marks, with a certificate, in those subjects respectively.

The Worshipful Company of Goldsmiths offer three prizes—of £5, £3, and £2 respectively—to the three candidates who, being employed on works in the precious metals in any part of the United Kingdom, shall obtain from the examiners the first, second, and next highest number of marks, such prizes to be distinguished as the "Goldsmiths' Company's Prizes."

Institutions.

The following Institution has been received into Union since the last announcement :—

Rugby Institute.

Subscriptions.

The Christmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Food Committee.

The Sub-Committee on Meat Supply met at 10·30 a.m. on Wednesday, the 27th February. Present :—The Right Hon. H. A. Bruce, M.P. (Chairman), Mr. C. S. Read, M.P., Mr. Harry Chester, Mr. Benjamin Shaw, Mr. Edward Wilson, and Mr. James T. Ware.

Dr. Thudichum having attended at the request of the Committee,

Mr. Shaw said at the last meeting of the Sub-Committee they had had laid before them specimens of meats and other forms of food preserved and prepared under different processes. It was felt by the Committee that they could come to no practical conclusion as to the relative value of those meats, in the absence of information with regard to their nutritive qualities and their adaptability to dietaries upon a large scale. The Committee were, therefore, desirous of hearing the opinion of Dr. Thudichum on these points, previous to considering how far they would be justified in recommending to the Government, or any other public body, that experiments should be made in some of the large public establishments with these forms of preserved meats, either as an entire or partial article of diet.

Mr. Chester said on the last occasion the Committee had before them specimens of raw meat from South America, preserved by Dr. Morgan's process, also by the paraffin process of Professor Redwood; but the Committee did not at present see that in either of those specimens there was a complete substitute for such meat as was required for the food of the people in this country. They had also before them a specimen of Dr. Hassall's flour of meat, which might be a very useful diet under certain circumstances, but was hardly a form of preparation that could be employed when meat was to be brought to this country from such distances as Australia and South America. The Committee also had before them specimens of Dr. Liebig's *Extractum carnis*. They thought that was a good thing as far as it went, but they wished to ascertain from scientific opinions how far they were justified in recommending experiments to be made upon these foods, on a large scale, in any of the public establishments. Possibly experiments might be tried in the Navy by feeding the crews of the vessels on

this *Extractum carnis* in connection with salt meat. In this way it might be ascertained whether the nutritive properties, of which salted meat was said to be deprived, could be compensated by the partial use of the *Extractum carnis*. The Committee would be glad to have the opinion of Dr. Thudichum on these various scientific points.

Dr. Thudichum—Allow me, in the first place, to make a distinction between extract of meat and meat itself. Extract of meat lacks the essential properties of nutriment. There is, I know, a very prevalent but erroneous opinion that extracts of meat, particularly that prepared on Dr. Liebig's plan, are nutritious. Of course, before I go further with that, I must define the term "nutriment." We know that the body wants in every twenty-four hours a given quantity of carbon, nitrogen, oxygen, hydrogen, phosphates, &c. Now, whereas Liebig's extract of meat contains these elements only in very small quantities, and that mostly in an oxydised condition, it is clear that any practical amount of Liebig's extract would not nourish in the least. Hence this extract, or any similar extract, cannot be called "food." We have to look upon extracts of meat simply as stimulants. Tea and coffee will not nourish a man; but both tea and coffee are strong stimulants of the nerves of the heart and the brain; and it is likely, I think, that the extracts of meat contain a substance which is somewhat similar in its effects to these stimulants. It may contain other substances which we do not know about, but the universal use of decoctions of meat, such as beef-tea, is only to be regarded in the same light as the habit of drinking tea or coffee. These are liquids containing an amount of nervous stimulant, and in that sense only Liebig's extract of meat must be considered. That is the view which I believe Liebig himself takes of his extract. He does not regard it as nutritive; on the contrary, he says it is astonishing that any liquid matter containing so small an amount of solid substance as broth should be by universal consent taken as a restorative, or for some purpose which we cannot define. If the Committee desire to know whether I should recommend them to have experiments made upon the extract of meat of Liebig (which in fact is nothing but condensed beef-tea), I must answer that I do not see that any experiments are necessary, unless they wish to open the entire question what is the sense of our drinking beef-tea or drinking broth.

The Chairman—What would be the difference of effect produced by drinking a cup of beef-tea and a cup of tea?

Dr. Thudichum—The effects of tea and beef-tea are, perhaps, rather analogous, though dependent upon different chemical agents. The effect of tea would be mainly due to the theine which it contains, and would consist in an acceleration of the heart's action, and greater vivacity of the mental powers. A similar effect would be produced by beef-tea, but not so much through its influence upon the heart as through its influence upon the nerves of taste and digestion, and upon the muscular sense, or sense of strength.

Mr. Chester—We are now dealing with the subject of meat. You say, as I understand, that the extract of meat is not nutritive?

Dr. Thudichum—There is so little nutriment, that if you dissolve a teaspoonful of the extract in a cup of water, and drink it, you would not receive so much nutriment as you would derive from a single mouthful of meat.

The Chairman—Then is the practice of giving beef tea to delicate children and sick persons altogether a mistake?

Dr. Thudichum—That I do not say. It seems to have an important effect, but the effect is not in the sense of nutriment. It is due to the specific effects of certain ingredients contained in it, especially creatine, the action of which, in some degree, resembles that of *theobromine*, found in cocoa. The creatine, which when in the system is changed into creatinine, has, perhaps, an action upon the heart, and upon the muscles, of which it is a constituent. Then we have in beef tea potassium salts, which the body requires for the production of muscular power. Potash is as essential an element in the chemistry of the muscles as in that of the blood. The chemical substances carried by the blood cannot pass into the muscles without the assistance of the potassium salts. Then there are contained in beef tea certain acids, of which lactic acid is one, and inosic acid another. If we look at the history of food among men, we find they have at all times made provision for acids in their food. The ancient Romans were acquainted with *sauerkraut*, or fermented cabbage. In Prussia and many parts of Germany they have a food made of fermented beans; and in Holland and many parts of southern Europe they have a preparation of fermented cucumbers; and many other vegetables are used in an acid state. This cabbage, or *sauerkraut*, is a strong acid, and so with the beans. These various foods contain lactic acid. This acid, or one identical with it in composition, though differing slightly in other properties, para-lactic acid, is contained in meat. There is no question that the fine flavour of meat—the *osmazome*—which provokes appetite, is due, in part, to the action of this lactic acid. If there is an absence of flavour in any kind of meat, lactic acid, if mixed with the gravy during preparation, acts as a substitute, and produces a relishing flavour. We find, besides, that lactic acid is useful for digestion. Then we have another acid, in various kinds of meat, called inosic acid; of that the properties are not well known. I have no doubt it has a similar action to lactic acid. Beyond that there are indefinable matters in beef tea, or extract of meat, of which we cannot say that they are not useful, but we know little of their effects. We have, therefore, as far as our present knowledge goes, to rely for an explanation of the efficiency of beef-tea upon these principles—viz.:—Creatine, or creatinine, para-lactic acid, inosic acid, inosite and potassium salts. Which of these are essential, and which not, we cannot at present tell. When extract of meat is mixed with water for use the solution should not be too strong. It is a common error, in making beef-tea, to put in an extra dose of this extract, but that is a mistake. Too strong a solution of extract of meat is as bad as too strong tea or coffee.

Mr. Shaw—Are there not carbonaceous matters in beef tea?

Dr. Thudichum—All these preparations contain carbon, but that carbon does not form food in the sense of the carbon in albumen, fat, or starch.

The Chairman—These preparations, then, you admit to be useful as aids to digestion, if they have not the necessary nutriment for the proper sustentation of the human frame. Salt meat being an imperfect food, may I ask you whether this extract of meat would form a complement to that?

Dr. Thudichum—I do not think so, because salt meat has been deprived of a certain amount of albumen. I think, however, the loss of nutritious value from salting meat is not very great on the whole. The deleterious effects of the long use of salt meat seem to be due to the effect of the excess of chloride of sodium.

Mr. Ware—What nutritive qualities are there in meat itself which the extract does not contain?

Dr. Thudichum—In fresh meat there is albumen, which is very nutritive in this sense, that it supplies the material which is necessary for the production of all the organs of the body. It is also useful in supplying heat, but not so much so as other constituents. We cannot build up the muscles, or the blood, or the eyes, or any other part of the body, without albumen. Next we have muscular fibrine, also termed syntonine. When we mince meat, and extract the albumen by means of water, there remains this syntonine undissolved, but when mixed with dilute acids it becomes a thin jelly, and is afterwards dissolved. Next we have myochrome—that is the

colouring matter contained in the muscles—and this is identical, in chemical composition, with the colouring matter contained in the blood.

The Chairman—Is that an essential element?

Dr. Thudichum—Yes, it acts in the breathing of the muscles during life, and for some time after death. As long as meat is in an eatable condition, this matter remains, so to say, alive; it takes up oxygen, and oxydises the noxious products of the spontaneous decay of albumen, giving out carbonic acid. Hence a butcher takes care to let his meat "breathe." If the meat were shut up close after being killed, it would become putrified in a few hours. This myochrome is a compound body, containing a quantity of iron. It is dissolved with the albumen, and precipitated with it during boiling. Besides albumen, syntonine, and myochrome, meat contains a very little gelatine, which, in the shape of connective tissue, binds together the muscular fibres. When you stew meat a long time the gelatine is dissolved, and you have nothing remaining but a bundle of hard fibres. Then we have the other substances I enumerated before as ingredients of beef tea, viz., creatine and lactic and inosic acids, potassium salts, and finally we have a brown syrupy matter, which is not more definable at present. I have already mentioned inosite, a kind of sugar, met with in French beans, as being also contained in muscle. There is another similar substance, sometimes contained in muscle, and that is animal dextrine or hepatin, or glycogenic substance from the liver. But this ingredient varies in a manner which is as yet unexplained. Sometimes, in working up half a hundredweight of meat, the chemist may get a pound of this matter, at others he may not obtain a trace. Now, when beef tea is made, the albumen and myochrome of the meat are made insoluble by boiling; the syntonine also remains undissolved; the fat fuses, and of the gelatine a small portion is dissolved. After straining there is nothing left in beef tea but inosite, creatine, creatinine, lactic and inosic acids, and potassium salts, and the brown syrupy matter. In case hepatic glycogen was present, this also would be contained in the beef tea. But I imagine that such glycogen would not remain in the extract as prepared by Liebig's company, for during evaporation this dextrine forms skins on the surface, like the skins on milk, which have to be removed, as they prevent evaporation. Liebig's extract would therefore probably never contain glycogen or animal dextrine, while fresh beef tea might sometimes contain it. It might perhaps yield the material for the change which is known as the "turning sour" of beef tea. I may add that meat contains 75 per cent. of water, and 25 per cent. of solids or residue after drying. Of these 25 per cent., 15 to 18 are insoluble in water, 7 to 10 soluble in water; but of these 4 to 4½ become again insoluble by boiling, so that it is not far wrong to say that only from 3 to 5½ out of 25, or from one-eighth to one-fifth of the whole of the solid constituents of meat pass into extract or beef tea. From four-fifths to seven-eighths of the solids are rejected.

The Chairman—Do you look upon meat as essential to human food?

Dr. Thudichum—Certainly.

The Chairman—If this be so, how is it that the ox, which grows so fat and strong, and which furnishes the richest meat, feeds entirely upon vegetable food?

Dr. Thudichum—Briefly, the ox has a different masticating and digestive apparatus from those of man. The food which the ox takes contains all the elements of the food on which we live. If we analyse grass we find it contains albumen and other compounds from which blood can be made. The stalks, leaves, and seeds contain all the ingredients which the body wants for living, particularly one essential matter called cerebric acid, which is the highest organic compound known. That is contained particularly in grain seeds, especially in indian-corn; eggs also contain it.

Mr. Ware—Chemically, there is no difference between vegetable albumen and the animal albumen on which man feeds?

Dr. Thudichum—They have the same percentage composition, though perhaps not the same atomic weight. We find cerebric acid, which forms brain matter, has an atomic weight of 2,007; fibrine, about 2,000; albumen, 1,608; and caseine, 807. Vegetable albumen might differ from animal, as caseine does from albumen.

Mr. Shaw—While these substances differ so little chemically, and yet their effects upon the frame are so different, does this not show that there is something in the question worthy of further experiment, and that chemical analysis is hardly trustworthy as to the effects of these matters upon the human frame?

Dr. Thudichum—With regard to the custom of drinking beef tea, there is much to be inquired into.

The Chairman—Following up what I have asked you with regard to the ox, it is clear we have not got the apparatus for converting vegetable food into what we require as the ox has.

Dr. Thudichum—No.

The Chairman—With regard to vegetarians; in what respect do you consider their diet to be deficient?

Dr. Thudichum—We can easily adopt a diet of vegetables only which will fully support our body, even in the wear and tear of London life. The vegetarians, here and in America, are a small example of the people in the world who live upon vegetable food. The Japanese as a people eat no meat, but in that country the cultivation of food seed plants has reached the highest point of perfection. It is by the use of seed plants especially that man is enabled entirely to do without animal food; as the organic functions of the plants attain the highest perfection, the seed is formed which contains all the essential elements of food. In this country there are great numbers of people who chiefly subsist upon vegetable food, in the form of bread. The Shakers, the Japanese, and many other peoples in different parts of the world, are practically vegetable feeders, and there is no difficulty in explaining how they manage to keep their bodies at the same weight and strength, and perform all the functions of life. There are some seeds which contain a large quantity of fibrine, albumen, caseine, and other ingredients, besides oil, acids, and starches. There is, for instance, Indian corn; that is remarkably adapted to the maintenance of the body. Then, again, we have the bean fruits; but they do not grow well in this country, because the heat is not sufficient; but beans in the warmer climate of the south are a magnificent food, and too much neglected in this country. Then, in addition, there are peas, lentils, and millet seed. These, taken together, will fully feed a man.

The Chairman—He must take a large bulk of such food?

Dr. Thudichum—No doubt. It is the advantage of meat that it supplies food in the smallest compass, and is dissolved early in the digestive canal. Vegetable food requires more digestion. Hence, the carnivorous animal has a short intestine, the herbivorous a long one. The house cat has gradually had its intestine lengthened, to adapt it to the digestion of bread and potatoes, and in exactly the same manner is the intestine of human vegetarians lengthened and widened to accommodate the greater bulk of their food. If sufficiently fed, vegetarians become big-bellied.

Mr. Chester—Are beans, lentils, and such food, easy of digestion?

Dr. Thudichum—There you have touched upon a difficulty in their use; these seeds require careful preparation. If not properly prepared, they pass through the stomach undigested. That is the main objection to the use of grain foods by the common people. They have neither the knowledge nor the means of properly cooking such food; therefore, practically, there is nothing like bread for them. It is soft; it is that which gives them the least trouble; it is most easily digested, and no other grain food can enter into competition with it,

Mr. Chester—What the Committee want to know is, what it is necessary to add to the *Extractum carnis* to give it the nourishing properties of meat, the supply of which is so deficient.

Dr. Thudichum—If you add eggs to beef tea you produce an equivalent, in a nutritive sense, to meat. That would make up fully for the loss sustained by the solid materials being rejected. You might also boil beans with the extractum, or add peas, lentils, or millet. Practically, it would be best to boil these seeds in soft water, or in water made soft by the addition of a crystal of soda, a sufficient length of time, and to add the extractum at the end of the boiling, just before serving. Seed one year old only should be used; seed two years old is not good. By such means beef tea or extractum may be made equally nutritive to meat.

Mr. Shaw—Have we not now arrived at a point at which experiments with regard to dietaries might be made with the *Extractum carnis* and the seed vegetables which Dr. Thudichum has spoken of?

The Chairman—No doubt experiments of this kind might be made, but I doubt whether these vegetables could be got in sufficient quantity, or at sufficiently low price, to form a staple article of food in this country. Is Indian corn equally nutritive in its young and soft state as in its hard and ripened condition?

Dr. Thudichum—No; in its young and soft state it has not one-fourth the amount of solid substance which it possesses in its ripe state.

Mr. Chester—Is it possible to preserve albumen for any length of time?

Dr. Thudichum—Albumen, when kept from the air, may be preserved for a long time. We can preserve it in eggs for a year or two; but though it may remain unchanged in its essential properties, it loses its appetizing qualities. That is the difficulty with preserved foods, that though apparently in a good state of preservation, they lose the qualities which make them acceptable to appetite.

Mr. E. Wilson—Would not these qualities be restored by the addition of appetizing condiments?

Dr. Thudichum—To a great extent, no doubt; but that presupposes a knowledge of the art of cookery. As the common people do not know how properly to cook the simplest thing, they would not succeed in imparting appetizing qualities to preserved food materials.

Mr. Shaw—Is it your opinion that the theory of cooking should be taught in schools, and perfected by practice afterwards?

Dr. Thudichum—I would let the theory of cooking enter into the teaching of the schools, and that would open the minds of the children to the fact that cooking is one of the most essential things to be learnt.

Mr. Shaw—I have mentioned this matter in connection with the educational examinations of the Society of Arts, but the opinion generally expressed was that cooking could not be properly taught apart from actual practice.

Mr. Chester—I assisted in the establishment of an Industrial School at Highgate, where all the girls were taught cooking and house work generally.

The Chairman—Do you not think it would be possible to prepare a catechism of cooking, or a few short, practical chapters, applicable to the condition of the poorer classes in this country, and which might be communicated to the upper classes before they left school without difficulty?

Dr. Thudichum—Undoubtedly. I have for a long time conceived the idea of preparing a little book, which might be called "The Spirit of Cookery," and which should contain the elementary principles of cooking.

The Chairman—What I should suggest would be a pamphlet of five or six pages, containing a few essential rules of cookery, applicable especially to the poorer classes.

Dr. Thudichum—Those rules would be very useful; but their execution would have to go hand-in-hand with a number of other practical improvements calculated to minister to the welfare of the lower classes. You have not only to give to them rules how to cook, but to put within their reach the necessary apparatus with which to cook, for the success of cooking is dependent upon proper apparatus for the purpose. No good and economical cooking can be done on grates as they are at present constructed. The introduction of a really practical and economical cooking apparatus for the poor would be a great boon.

Mr. Chester suggested that every good apparatus which was introduced might be tried in the first instance in the model lodging-houses, such as those founded by Mr. Peabody. He also suggested that a very useful charitable association would be one for the distribution of iron pots among the poorer classes.

Mr. C. Wilson—I would ask one question of Dr. Thudichum. Have you given any attention to the subject of the rate at which, running over the whole scale of articles suitable for diet, sufficient quantity could be purchased for a man in health to fill his stomach comfortably, as any one of us would do at an ordinary dinner?

Dr. Thudichum—He could probably do so at the cheapest rate upon bread and cheese.

Mr. E. Wilson—I presume you mean that that would be the lowest rate now, with the present limited choice of articles of food; but, supposing he had the whole range of diet available, and was educated in the proper preparation of food, would he not be able to fill his stomach with food cheaper than bread and cheese?

Dr. Thudichum—I am not able to answer your question off-hand; it is a subject that would require investigation.

Mr. E. Wilson—In the East various kinds of bulbs are eaten, cooked with a little fat. I am sure a meal may be made from them cheaper than with bread and cheese.

Dr. Thudichum—Possibly such forms of vegetable food might be imported with advantage, but we have cheese in this country, which they have not in the East; and the cheese, though taken in small quantity, affords an amount of nutriment which the other kind of food does not supply. I may add another consideration; no doubt, beans and peas, lentils and lupins, are a good kind of dried seed food, and cheaper than any other description; but when the question arises of producing them in this country the laws of agriculture interfere, and it is found that here it will not pay the farmer to grow anything except the best grain. Lupins would be the last resource of agriculture. Where the soil was insufficient to grow wheat and beans and peas you might grow lupins, because the roots of these plants strike deeply into the subsoil, and gain what nourishment there is there.

Mr. Shaw—Are there not vast extents of such land abroad, where they would be glad to grow such grains for exportation? and they might be grown in places otherwise unproductive, if the demand was sufficient to induce a large amount of cultivation.

Mr. Read—Dr. Thudichum has told us of the difference between the nutriment contained in tea and beef tea, will he be good enough to tell us the difference between the nutriment in malt liquor and beef tea?

Dr. Thudichum—The nutriment in malt liquor is greater than in beef tea; it contains alcohol, which is food. I will state the grounds on which I base that assertion. Last summer I performed an interesting experiment. I invited my class in pathological chemistry to meet me one afternoon in the gardens of the present St. Thomas's Hospital, formerly the Surrey Zoological Gardens. There were thirty-three in number, including myself. We drank, from two o'clock in the afternoon till seven in the evening, 44 bottles of wine, consisting of white and red Hungarian, Burgundy, and Sauterne. The wine had been previously analysed, and the quantity of alcohol it contained determined. The 44 bottles of wine, drunk by the 33

persons, contained, in the aggregate, 4,000 grammes of absolute alcohol. The whole of the urine passed by these people from two o'clock in the afternoon till six o'clock the next morning was collected and distilled. There were 24 distillations; and there were left, after the last distillate had been dehydrated, 10 grammes of alcohol, the rest having been burnt up in the system. Supposing that ten grammes more passed out with the breath and through the pores of the skin, it would give only five grammes out of every 1,000, or a-half per cent., as the quantity which was left unused by the economy. We have here a direct proof that out of the whole quantity of alcohol drunk only a quarter per cent. was excreted by the kidneys.

Mr. E. Wilson—Is it quite certain that all the alcohol that was retained was beneficially used up?

Dr. Thudichum—I have no doubt all was beneficially used up. I do not say that for a man to drink a bottle and a quarter of wine is beneficial to him, but I say this—that whatever alcohol it contains has a stimulating action, and, moreover, a warming action.

Mr. Critchett—Against this experiment may be placed some investigations made by two French chemists, MM. Lallemand and Perrin, and supported by Dr. Edward Smith, tending to show that as soon as alcohol is taken it at once begins to pass off, through the skin and otherwise, perfectly unchanged.

Dr. Thudichum.—These experiments are quite inconclusive, as no estimation of the quantity of alcohol passing off had been made, which I regard as very small. Besides, alcohol contains sugar and gum. It also contains albuminous matters, which cause it to ferment; they are digestible. Then it contains phosphates in considerable quantity. The phosphates abound in fruit and grain, in bread, and in meat, and no doubt they are of great importance in the animal economy. Then there are in beer certain undefinable substances—the brown syrupy matter, which we cannot define. There is also acetic acid in beer, and the extract from the hops, which are, to a slight extent, narcotic, something like tobacco.

Mr. Chester—There is no nutriment in hops?

Dr. Thudichum—No; it merely has a soothing effect upon the brain.

The Chairman mentioned that the result of an experiment tried by a contractor with a number of navvies working at night at a tunnel, one gang being supplied with bread and butter and coffee, and the other with bread and cheese and beer, was, that the larger amount of labour was performed by the men who took the bread and butter and coffee.

Mr. E. Wilson remarked upon this that the men put upon the coffee regimen might not have confined themselves to that beverage, while with the others it might have been a question of an extra quantity of beer, and it would not be known what quantity of beer the men might have drunk in the day time.

Dr. Thudichum—There is no doubt whatever that alcohol drunk at certain times, in certain conditions of the body, takes off the edge of the understanding, and should not, therefore, be taken early in the day. On the other hand, if a man is tired from a morning's work, and has taken as much food as he requires, he feels a craving for something which more food would not supply, and that is given in alcohol.

The Chairman—What do you say to the particular experiment with the navvies which I have mentioned?

Dr. Thudichum—The experiment you have related it is impossible to judge of, for this reason—you do not know what the precise condition of those men was. You do not know what they had eaten and drunk the day before, and what they were accustomed to eat and drink. One set of men may have been accustomed to beer and the other to coffee. To one set of men it may have been so much extra beer acting upon what they had previously taken.

The Chairman—*A priori* do you assume, supposing the men to have been moderate in their previous living, that the bread and cheese and beer would be as good food for them as the bread and butter and coffee?

Dr. Thudichum—I have no doubt of it.

Mr. Read—Supposing a labouring man, whose chief diet was bread, were to drink a glass of beer, would that be a substitute for the meat which he could get for the same money?

Dr. Thudichum—It would be but a poor substitute. The nutritive value of the beer would be very small compared with that of the meat. If a man spent fourpence in beer he would not obtain half the nutriment he could get if he spent the same amount of money in meat.

(Dr. Thudichum, having received the thanks of the Committee, then retired.)

Mr. Philpott, having been introduced to the Committee, stated that he had been in the habit of melting down 1,000 to 1,500 sheep per day, in Australia, for four months together, but he had tried in vain to discover any process by which the meat could be preserved for food, except, perhaps in the form of the extract. He had had great quantities salted but it did not succeed.

The Chairman—Supposing a means were discovered of preserving meat in a fresh state for many months, could such a supply be obtained from Australia and other parts, as would make the business commercially successful, and afford such a supply of meat as is required in this country?

Mr. Philpott—An unlimited supply of the very finest quality of meat could be obtained. We only want the means of preserving it. Throughout the vast tracts from Victoria to Brisbane there are no means of disposing of the carcases except by melting them down.

The Chairman—You know of no means of preserving the meat so as to make it a useful and valuable article of export to this country?

Mr. Philpott said he knew of none except Liebig's process, used by Mr. Tooth. If the extract of meat were made upon a very large scale, he thought it could be sold at half the present price in this country, seeing that a bullock cost only about £3 or £4 in Australia; but he could not state the quantity of extract which such a carcase would yield. At present the meat itself could only be preserved by salting it so intensely that people would not eat it in this country; and he was not aware of any means by which the salt could be extracted from the meat on its arrival here. Legs of mutton salted were sold at 3s. per dozen, and they were the finest quality of meat, but they had become hard by the salting. He believed if a process of preservation were discovered to enable meat to be brought from Australia or Buenos Ayres, in such a condition as would lead to its use in this country, it could be sold with profit to the producer at 2½d. to 3d. per pound.

Cantor Lectures.

"On Music and Musical Instruments." By John Hullah, Esq.

Lecture I.—Monday, March 4th.

Harmony, &c.

Mr. Hullah, after briefly cautioning his audience not to expect a concert, to which the lecturer was to stand in the relation of programme; and professing his anxious desire to aid in the work of the Society of Arts, which he conceived to be to collect, cherish, and diffuse ideas, spoke of the music of the ancients, the nature of which the researches of scholars had been far from successful in revealing. He quoted a passage from Professor Blackie's "Homer and the Iliad," which showed, not so much what Greek music was, as what it was not—anything in the least like the music of modern times. Music as a self-sustained and self-contained means of addressing the senses and the intellect, is a new art, the youth of which had been witnessed almost by men living;—and not merely a new art but a new

science; for the "music" of the *Quadrivium* represents principles about which modern musicians give themselves no concern. This, in some respects is to be regretted. In the entire neglect, for instance, of Acoustics (once the principal part of music), musical performers, as well as composers, have possibly lost or delayed the discovery of many truths and first causes, which they alone have the organization, the opportunity, and, it might seem, the motive, to search into. From the separation of practical music from acoustics, improvements in musical instruments have been fewer and further between than in other branches of mechanical application; varieties occur in pianofortes, for which the makers are unable to account; and in the construction of rooms for musical performance, or public speaking, failure is at least as common as success. Possibly, however, as there are graces "beyond the reach of art," so there are truths out of the depth of science; but this need not prevent our cultivating the graces, and using the truths accessible to either. The first principles of the science of harmony are intimately connected with the first principles of the science of acoustics, and many things in the former are best explained—can only be explained—by the latter. The lecturer then, as a preliminary to the demonstration of this, proceeded to explain the cause of sound, and the qualifications necessary in order to make sound musical. The vibration of the air must be regular and sufficiently frequent, otherwise sound is not appreciable; on the other hand, if vibration be too frequent, its result will be inaudible. There are means of demonstrating the existence of sound beyond the reach of our organisation. The pitch of a sound depends on the number of vibrations communicated to the atmosphere by the body which causes it, in a second of time. There are many ways of ascertaining the number of these, one of the simplest and most easily explained being the invention of Mr. J. Henry Griesbach. A drawing of this instrument was then exhibited, and its action shown. A fourth part of a string, itself too long and heavy to make a musical sound, is isolated, and tuned to any pitch required. The entire string is then set in motion, and the pace of its vibrations being moderate (not exceeding eight or ten per second), they are without difficulty recorded on a paper wound round a cylinder by a pin attached to a spring, struck by the string at each successive vibration; another pin, connected with a seconds pendulum, marking the recurrence of each successive sound, and consequently the number of vibrations made in it. Mr. Hullah wished to draw especial attention to this and other similar instruments, because it is very commonly thought that evidence about pitches in different countries and times rested altogether on tuning-forks—instruments notoriously liable to injury and change. The fact that elevated sounds result from such prodigious numbers of vibrations is calculated to excite astonishment; not more so than another—that there is no such thing as a simple unmixed sound, or at least that no such sound can be maintained for more than an instant. The lecturer then proceeded to explain the nature of harmonics, and the construction of the harmonic chord, not for its own sake as a natural phenomenon, but on account of its bearing on practical harmony. Harmony is justified (if it require justification) by the harmonic chord, which proves that polyphony has its basis in nature. An elegant passage from Rousseau was quoted on the other side, but, happily, discussion on the comparative merits of harmony and melody is now practically useless. We cannot get rid of harmony if we would, and would not if we could. Mr. Hullah then proceeded to show that the relation of harmonics to their prime—the constitution of the harmonic cord, accounts for much that has long been universally accepted as true among harmonists—that had even been accepted by them, and practised empirically before that construction was understood; science in this, as in other cases, subsequently justifying art. From the harmonic chord we first derive the triad, and ascertain what notes within the limits of a common cord can be doubled or repeated in the octave,—hence, what is the relative importance or effectiveness of those notes. Again, the harmonic chord furnishes us with a general law for the arrangement of chords—having its largest intervals lowest, its smallest highest. Moreover, it is a combination in which the ear will not rest—in musical language, a *discord;* not a discord in the common literary or poetical sense, but a combination, of itself often beautiful, and always suggestive of continuity, sequence, or something to come after it. More than all, the harmonic chord includes always two sounds, the relations of which may be regarded as the first principle of modern harmony, and that which distinguishes modern music, more than any mere superficial difference, from the music of the 15th and 16th centuries. These two sounds are the 4th and 7th of the natural (or any like) scale, whose contact or neighbourhood alone reveals that scale, and whose resolution on the 3rd and 8th decides not only the scale but the *mode*.

The musical illustrations were exhibited on diagrams, as well as played on the pianoforte by the lecturer.

Thirteenth Ordinary Meeting.

Wednesday, March 27th, 1867; Colonel W. H. Sykes, M.P., F.R.S., in the chair.

The following candidates were proposed for election as members of the Society:—

Beaumont, Somerset, 144, Piccadilly, W.
Dunderdale, James, Tiverton-lodge, Cheetham-hill, Manchester.
Hopkin, W. K., 5, New Cavendish-street, W.
Hutchinson, Robert Hopwood, Tenter-house, Rochdale.
Karslake, Sir John B., M.P. (Solicitor-General), 50, Pall-mall, S.W.
Nield, Jonathan, Dunster-house, Rochdale.

The following candidates were balloted for, and duly elected members of the Society:—

Busbridge, Walter, 4, Chester-place, Plumstead, S.E.
Guise, Francis Edward, 2, Middle Temple-lane, E.C.
Ingall, Charles, Mellish's Wharf, Limehouse-end, Millwall, E.
Johnson, John Robert, 31, Red Lion-square, W.C.
Keating, Lorenzo, 231, New-cross-road, S.E.
Kernaghan, B., 70, Bishopsgate-street Within, E.C.
Oliver, Thomas, 66½, Northumberland-street, Newcastle-on-Tyne.

The subject introduced for discussion was—

STORM SIGNALS AND FORECASTS, THEIR UTILITY AND PUBLIC IMPORTANCE WITH RESPECT TO NAVIGATION AND COMMERCE.

By Christopher Cooke, Esq.

The science of meteorology, or of weather knowledge, even when viewed irrespective of prediction, seems to be even yet in its infancy. The Egyptian geographer, Ptolemy, in the second century of the Christian era, wrote upon this subject, and he described the particular constituents of the atmosphere, the character of meteors, and what he deemed to be rules for predicting various atmospherical phenomena. Since his day various observers have studied this important subject, and some of them have published, in America as well as in Europe, the results of their labours; yet our present Astronomer Royal is reported to have declared at Aberdeen, so recently as September, 1859, that, "with respect to aqueous vapours and atmospheric waves, inquiries had only served to throw obscurity on the subject, and he regarded the science of meteorology as one of the most desperate with which we have to deal." Not many months have passed since I read a statement that Sir John Herschel disclaimed the unenviable title of

a weather-prophet; and an eminent French astronomer has expressed a similar opinion respecting weather wisdom, whatever may be the progress of science. The late Mr. William C. Burder, of Clifton, would not undertake to predict weather for more than twenty-four hours in advance; and even this mild state of prediction he would not venture to publish, while other meteorologists scout the idea of prediction entirely.

On the other hand we find there are various prophets, each conscious that his system is the best, and that it must prevail. A well-known writer upon predictive meteorology, Mr. W. H. White, the weekly London correspondent of the *Mark Lane Express*, observed, a few years since, with respect to these systems, that "first and foremost on the list stands Admiral Fitzroy, backed up by Government support and high patronage throughout the length and breadth of the land; but his predictions are limited to storm periods from observation alone, and hence his predictions are at short date, sometimes a few hours only, and at most twenty-four to thirty hours. Yet, even these enable him to send telegrams to most of the English ports to warn the sailors that a stormy period is at hand, by which means he has saved the lives of many brave seamen, and prevented the loss of much valuable property. This method, useful as it may be, does not furnish the most remote hint at the cause of the predicted storms thus signaled, and hence, whenever it shall please the God of storms to remove the admiral from among men, the theory of the cause of storms, forecast, will die with him, and man will still be as ignorant as before the admiral commenced his career—a grievous state of things, but true. Storms predicted by him did not come at all, while others came unpredicted, so no theory can be attached to such a course of prediction, notwithstanding that his system produced many important results."

Then there is the plan of comparing one season with another, yearly or by a cycle of years, carried on by the late Mr. Howard, by Mr. George Mackenzie, who paid much attention to the east wind, and by other observers. Mr. Thomas Plant, of Birmingham, makes his predictions by comparing one season with another one, and then he draws his conclusions accordingly; while the equinoctial theory, advocated by Dr. Kirwan during the last century, and recently by Mr. Thomas Du Boulay, has its admirers; and Lieut. Saxby, R.N., is a believer chiefly in the lunar influence. The astro-meteorologists, since the time when Admiral Fitzroy suggested that perhaps the astrologists of old were wiser in their generation, have taken the title of astronomic meteorologists, and they teach that the great changes of pressure, temperature, draught, moisture, electrical displays, heat and cold, are caused by solar, lunar, planetary, and cometary bodies, according to their respective lights and aspects, as they move through space, and form certain angles.

The Report of the Committee "appointed to consider certain questions relating to the meteorological department of the Board of Trade," dated in May, 1866, clearly explains the history and mystery of Admiral Fitzroy's occupation, as well as the results of his ill-understood but partially useful labours with respect to meteorology. Let all persons interested in this subject read and well consider that elaborate statement. I can only refer to it briefly upon this occasion. It appears that so long since as the autumn of the year 1851, Lord Palmerston's Government issued instructions to our British consuls to assist in the collecting of statistical information respecting atmospherical phenomena, in order to assist the investigation of storms, which was carried on by Colonel Reid; and this fact of itself proves that the subject has been deemed important by the British Government.

In 1852, Lieut. Maury, on behalf of the United States Government, collected various marine meteorological observations, and Sir John Burgoyne, British Inspector-General of Fortifications, contemplated some land observations, and suggested to Lieut. Maury that both schemes should be conducted on one plan. After some correspondence and delay, a conference met at Brussels, in August and September, 1853, which made suggestions respecting various meteorological instruments, and prepared a form of meteorological register, with instructions, to be used for observations at sea. In 1854, the Royal Society, in reply to a communication from the Board of Trade, made suggestions respecting the observations, but there was "no indication that it was a part of the functions of this department to publish undiscussed observations, or to speculate on the theory of meteorology, still less to attempt the prognostications of weather." Ten years since Admiral Fitzroy contemplated his system of forecasting weather, and five years later he reported that "by continued and consecutive series of charts, constructed on the simultaneous principle, an insight into the laws of our atmosphere, into meteorological dynamics, had been gained, which enabled us to know what weather will prevail during the next two or three days, and when a storm will occur."

At the meeting of the British Association, in September, 1859, at Aberdeen, "the Committee of the Section of Mathematical and Physical Science" having represented the probable importance of occasional telegraphic communication between a few widely-separated parts of Great Britain and Ireland, by which warning may be given of storms, the General Committee recommended an application to the Board of Trade for such an arrangement as might further the object authoritatively. Consequently, in the year 1855, Admiral Fitzroy, as an officer of our Government, and on behalf of the Meteorological Department of the Board of Trade—established at £4,200 a year—prepared an experimental plan for the conveyance of intelligence of approaching storms; and on the 25th February, 1860, the Council of the British Association ruled "that storms existing at one place should be telegraphed to other places; but they did not intend the elaborate system of foretelling probable weather that was subsequently adopted."

Admiral Fitzroy deemed his five years' data sufficient for the system of forecasts, and for predicting the weather generally. In 1860, 15 stations in the United Kingdom were appointed for receiving continental telegrams of weather through Paris, and for the daily communication there of our weather. In February, 1861, he first gave his weather warnings and storm signals, which, in August, 1861, were extended to 80 additional places, making 130 altogether; and daily forecasts of weather were gratuitously published in the London newspapers. These soon became popular, although opposed and derided by some persons. Foreign Governments were much interested in the system. The predictions were sent to Paris, and the system was adopted there and at Berlin, as well as in Russia, Holland, and Italy. Occasional warnings were sent to foreign countries by the English Meteorological Office. On the 5th June, 1860, the *Times*, in a leading article, had thus referred to the "shocking character of the wreck register. In 1859, 1,600 persons perished within sight and reach of our own coasts, while coming storms might be accurately predicted by barometers, which, with anchors, cables, and lifeboats, would be the means of saving many lives, provided that a central station, communicating by telegraph with distant parts of Ireland and Cornwall, could convey meteorological information to distant parts of Britain. That Admiral Fitzroy had supplied, for £4 each, a good barometer to thirty-three of the poorest, exposed British fishing villages." On the 26th June, the well-known "J. O." in the *Times*, stated that twenty fishing-boats had been lost recently, with all hands, on the Norfolk and Suffolk coasts, whereby 180 men had perished, leaving widows and children destitute.

On the 6th September, 1860, meteorological reports were published from fourteen places, and by telegraph from twenty-five places, respecting wind and weather. Shortly afterwards, the *Times* reviewed Admiral

Fitzroy's manual called "How to Foretell Weather," and published it in complete form, as a work of public importance. On the 11th February, 1861, the same journal recounted in one column the account of a north-east gale, and stated, "All the much frequented parts might have been warned three days before the storm. The late storm might have been predicted with as much certainty as an eclipse, and could have been announced by signals as conspicuous as fiery beacons, as all points of our coasts are connected by telegraph wires, and there can be no difficulty in showing signals. We think it highly desirable that the system should be established without delay. The destruction of human life and property on these occasions is so appalling that we cannot keep the subject too constantly before the public. Seamen do but share the common failing in neglecting the warnings of the barometer. These warnings have now been so deeply studied, and the information obtained has been reduced to a shape so practical and beneficial, that it would be deplorable if such advantages were thrown away. If some ports can receive timely information of a tempest, all can be similarly warned, and information should be published respecting the attention paid to them." On the 30th June following the *Times* stated that the general opinion was that the weather reports were valuable, and remarkable instances thereof had occurred. The same journal, on the 11th of April, 1862, observed, "The success already attained, and the practical good effected, justified the allowing Admiral Fitzroy to continue his experiments at the moderate cost they occasioned, for the storm drums obtained the faith they deserved, for seamen would no more like to go to sea when they were hoisted than on a Friday. He merely warns of danger—'look out; be on your guard; see to your glasses.' He has saved many fishermen's lives, and disseminated the knowledge of the use of the barometer. Even as a rain-prophet he need not be discouraged." There were some opponents and critics who doubted entirely the utility of the system, and amongst them may be named Mr. A. Smith, of Scilly, late M.P. for Truro; while other persons believed that the new system was partially beneficial at least, and would become more so.

According to the *St. Leonards Gazette* of the 3rd May, 1862, during the preceding months of March and April, out of Admiral Fitzroy's 59 predictions, 23 were successful; his opponents suggested that the law of chances would have used him better, but they should have remembered the assertion of Cicero, that he who has once predicted truly has a legitimate title to be deemed a prophet. Besides opponents, one of whom even in the year 1859, feared he would "not do much for the science of meteorology, being deficient in the elements, and on the subject of vapour in the air entirely befogged,—yet in search of the truth,"—sometimes he had to contend against anonymous triflers, whose false notices he contradicted, as upon one occasion, when official notice had been given from Lisbon of a severe storm to occur between 8th and 18th December, 1864, when the fishing boats returned in such alarm and haste that the nets were left at sea. Irrespective of this testimony to the credit which his system had obtained, I may select the following published verifications, amongst others not enumerated:—

Shields, 23rd February, 1861.—After the telegram of 21st, a storm signal was hoisted, when a very considerable fleet remained in port. About midnight, a hurricane of wind came on with a torrent of rain, and it continued to blow great guns for several hours.

13th March.—The signals at Liverpool arrived almost daily, and many maintained that the warnings of danger were of unquestionable benefit, resulting eventually in the saving of a great amount of life, and valuable property.

Shields, 19th March.—Furious gale followed a warning.

Shields, 11th January, 1862.—To-day we have another storm signal hoisted, indicating dangerous winds from the north. There is every prospect of a bitter night, as the wind chopped round nearly to the north, a severe gale threatening to increase in violence.

7th August, 1862.—Soon after the storm signals had been hoisted at the harbours and headlands of the British coasts on the 6th instant, the weather became unsettled, and there has been a succession of terrific squalls with torrents of rain.

October 13, 1862.—The storm signal had not been up for many hours before squalls broke over the coasts with much force. The signal to the seamen of the Tyne was "Look out for squalls." On the 17th another signal was followed by a similar storm, with sleet and rain. On the 12th, 13th, 17th, and 20th, signals were shown. On the 22nd, an alarming gale raged over London; and on the 19th of the month also at Yarmouth, rendering the masters of ships cautious in making all snug. Scarcely any part of the coast escaped the fury of the gale.

At Shields, on 23rd October, no sooner had the storm warning appeared, than the wind commenced to blow in heavy squalls. Some colliers would go to sea. Again, on 20th December, a gale burst on the coast immediately after the signal. In January, 1863, at Shields, early in the month the signal was followed by a storm, and at Swansea, on the 24th, another storm followed the signal. The same at Shields, where, on 14th May, a storm followed the signal again.

On 23rd July, 1863, the herring fishing boats took shelter in Whitby, having attended to the warning, which was followed by high wind. On October 1, at Shields, a gale followed with rapidity the storm warnings.

On October 16th, along the coast of West Cornwall, the storm of 12th and 13th raged with violence. A few shipping casualties occurred, but, "thanks to Admiral Fitzroy, and to those who have learnt in the school of experience, the smaller craft have found that forewarned is forearmed." Signal was hoisted the day before.

On October 30th, at Cardiff, the signal was followed by gales, continuing all day and night; also at Edinburgh, and elsewhere.

On November 1st, at Portsmouth, and again on the 4th, the signals were followed by dangerous winds. Signals for three days. "Internationally, there was then regular meteorologic correspondence from France, as soon as from Ireland and Scotland, at 10 a.m., when Admiral Fitzroy's notices arrived in Paris. The gale of the 1st and 4th November were signaled on the north and west coasts of France, and the west coast of Europe, in good time," wrote the Admiral on the 7th November.

On December 1st, at Shields, the signal of dangero winds from opposite quarters, and on the 6th, at Portsmouth, the warning signals, were speedily followed by gales. On the 3rd, Mr. Thomas Plant stated in the *Times*, "the warnings of dangerous winds from opposite directions have been this week truly carried out in the results."

On 8th December, a great gale in the north of England was pointed out by the forecasts, and the director of the Paris Observatory mentioned the services rendered by the meteorological department carried on according to Admiral Fitzroy's principle.

In 1864, at Shields, on 11th January and 22nd January, and in North Lancashire on the 12th and 13th February, gales followed the hoisting of the signals there. In 1865, on the 11th January, at Shields, the storm-warning was followed by a gale, and again on the 22nd a similar result followed. In February, on the 13th, the west coast of North Lancashire was visited by gales, according to Admiral Fitzroy's telegram; and on the 15th a similar result followed at Portsmouth, where it was suggested that the signals should be repeated by means of the coastguard, as they would be of the greatest benefit to our mercantile marine, even at sea.

From Admiral Fitzroy's death, on the 30th April, 1865, until the 7th December, 1866, the signal and forecast system was continued at intervals with great skill by Mr.

Babington. During the last month of its existence, on the 7th, 12th, 22nd, and 29th of November, the cautionary signals were followed by storms and rough weather at and near the places warned. On the 3rd and 6th December, similar results followed the warnings, when they ceased by order of the Board of Trade.

Mr. A. J. Pearce, author of "Astronomic Meteorology," deemed the Admiral to be successful in forecasting storms 24, 48, or even 72 hours in advance, but on the approach of a northern gale the mercury does not fall, hence in such cases the warnings were too late, yet frequently useful to fishermen and coasting vessels. The Admiral admitted to this author, in the year 1864, that, believing the moon to be a great disturber by gravitation, while the sun is by heat chiefly, he was so far a lunarist, but he did not believe in astronomic meteorology. He believed a forecast to be the expression of probabilities and an experimental process, not a dogmatic prediction, and that some gales, especially from the north, came on suddenly and without warning, while in other cases the warning would extend over a space of several days. With respect to this remark, it should be remembered that fifty warnings, of 72 hours each, would extend over the whole winter, as the Committee have stated in their Report.

An Edinburgh critic of the forecast system stated that out of nine telegraph warnings sent there in October and November, 1864, only one arrived before the storm began, and one was a mistake. He was of opinion that if our station-masters desired to make genuine forecasts they must have two-hourly telegrams, sent directly from the west coast of Ireland, to be compared with their own barometers, although Iceland or the Isle of St. Kilda would be better, as in Britain we are too close upon the Atlantic to forecast storms for days before they arrive. He adds that Admiral Fitzroy's system, imperfect as it was, well deserved the expense of carrying it out. The fluctuations of the barometer were watched before boats put to sea. The hoisting of the drum had taught our sailors the value of meteorological science, and, so far, the practical fruits of the system were realised, which might be extended by means of the Atlantic telegraph. The *Daily Telegraph* of October 22, 1862, gave Admiral Fitzroy credit for having predicted the storm of 19th October, when the gale raged during the night with the energy of a hurricane:—"Yet, in the face of his 'cone,' hoisted apex downward, the Shields' colliers coolly put out to sea! It is impossible to deny that the Admiral's storm-cone has sometimes been hung peak uppermost when the provoking wind has come from the southward, and *vice versâ*. Can nothing be done then—has science nothing to say? Unforeseen disturbances, data not allowed for, may upset his calculations; but, as the field of meteorological inquiry is widened, and its deductions fortified, a very high degree of certainty will be obtained." The report of the committee upon the subject tends to confirm this idea.

In an explanatory note in the *Times*, 20th June, 1864—which journal, on account of the character of the science, if it could be founded, was disposed to make every allowance for the special cause of any occasional failure—which had brought discredit on his prophecies, Admiral Fitzroy disclaimed the title of prophet—"for they are not predictions." Forecast he deemed applicable to such an opinion as is the result of scientific combination and calculation, liable to be marred by an unexpected downrush of south wind, or by a rapid electrical action, not yet indicated to our limited sight. He explains, further, that inland situations are not affected by winds like the sea-coasts, Liverpool feeling chiefly the north-west and south-east winds; but the valley of the Severn is exposed to south-west and north-east winds. North-east winds are difficult to foretell, as the barometer rises before they blow, even with rain, and at such times the thermometer is a good guide. But in practice, many dynamic chemical and electrical considerations are indispensable, even for 48 hours, and on his barometers supplied to fishermen, these words were endorsed:—

"First rise after very low,
Indicates a stronger blow."

In the Report of the Committee, and in the letter contained therein, dated 15th June, 1865, written by the President of the Royal Society, the great value of the storm signals was recognised, for out of 56 opinions given in 1862 by shipmasters, 46 were favourable, 3 unfavourable, and 7 were neutral. From 1st April, 1863, to 31st March, 1864, 2,288 signals were hoisted, of which at least 1,188 were justified by the state of the weather when the message arrived or within 48 hours afterwards. That is, as to force of the wind, but with respect to its direction, about two were correct to one incorrect. Of the cautionary signals, between 1st April, 1864, and 31st March, 1865, out of 40 cases, 29 were successful, 8 failed with respect to force or direction, and 3 were late, being a decided improvement of the system. The following certificates, given in 1866, likewise testify to the value of the system:—

Aberdeen Marine Board:—"The utility of the signals was acknowledged, and the subject obtained more attention, they having been accurate for a considerable time."

Dundee Local Marine Board:—"Very generally appreciated; the correctness being a matter of common remark."

Shipowners' Society, South Shields:—"Of much practical value."

The Pilots, South Shields:—"Of great importance and practical value."

Mercantile Marine Office, Sunderland:—"Decidedly valuable. More correct than formerly."

Collector of Customs, West Hartlepool:—"More trusted by seafaring men."

Receiver of Wreck, Great Yarmouth:—"They are watched by seafaring men, and have improved in accuracy."

Collector of Customs, Deal:—"They have saved life and property to an immense extent."

Local Marine Board, Plymouth:—"Not in any great degree of value."

Mercantile Marine Association, Liverpool:—"Decidedly in favour of their continuance."

Local Marine Board, Liverpool:—"Very valuable; amount of accuracy has increased."

The committee, in their report, explained the manner adopted for making the forecasts, but the practice did not seem to be carried on according to definite rules, nor did the maxims appear founded on any sufficient induction from facts, the data not being enough for an accurate test; moreover it is difficult to compare the forecasts of one period with those of another. As a rule, they agree neither with each other nor with the storm warnings, and we do not know, the committee states, what weather will prevail during the next two or three days, and when a storm will occur. No good reason appears why a government department should issue them. With respect to the storm signals, the success has been greater, and, so far as they indicate the force of coming gales, they have been of some use, and their utility is widely admitted. They have improved, and probably are capable of greater improvement; but, with respect to the direction and force of coming gales, the warnings were not sufficiently correct to be useful. Ninety-five barometers had been supplied to fishing villages, when the committee issued their report, with instructions respecting their utility. The committee recommended that the system of telegraphing the weather be continued, but that the daily forecasts be discontinued; that the practice of issuing storm warnings be continued, but that no statement be made respecting the probable direction of the wind, nor warning issued unless the gale is expected within 48 hours. They credit the late Admiral Fitzroy with zeal and perseverance in establish-

ing the highly-prized systems of storm-warnings, and it will not be forgotten that he gave the first impulse to this branch of inquiry, and induced men of science and the public to take part in it, and who sacrificed his life to the cause which others may hope to advance.

In effect, since 7th December, 1866, the system has been postponed indefinitely, until the science of meteorology shall have been sufficiently perfected in the opinion of scientific men to justify its reappearance on the scientific stage, to receive, doubtless, a cordial welcome. Meanwhile, how about the fisherman's boy, and the three,—or it may be thirty,—or three hundred fishers who, in the absence of caution and of knowledge—the staff of mental life—may go out to meet death in the deep, deep sea? Shall the stormy winds "blow, and crack their cheeks"—with Death ready to launch his dart—at the victims, while we have a Greenwich Observatory, and many other observatories, a Royal Society, and other societies—a body of scientific men, and a Government with money—all looking on, and grasping at the shadow, while the substance is perishing for lack of the knowledge which, even now, these "masters in Israel" or guardians of *Salus Populi*, may be expected to supply? To quote the language of the *Daily Telegraph*—"Can nothing be done, then? Has science no good word to say for these gallant men and good ships (half of which are composed of colliers) to be caught in midcourse, and 'whelmed in the briny ocean?" The language, also, of the Royal Society's Secretary should be remembered:—"The proper test of the efficiency and usefulness of a system of cautionary signals at the different ports, is to be sought in the measure of utility which it appears to have attained; always remembering that the system can only be regarded as in its infancy; and its improvement, and, consequently, its importance, may be expected to be progressive from year to year."

The value and practical nature of the storm signals have been shown, and either in their original, or in a modified form, they should not be discontinued for twenty-four hours. But such discontinuance having occurred, it is suggested that, as is now the case at Kingstown Harbour—and perhaps elsewhere—the hoisting of a cautionary signal at each of our chief ports might be undertaken irrespective of the Government, as an affair of local management, temporary, and subject to local superintendence. For instance, when the barometer, which generally indicates the advent of great and dangerous storms, falls below 30in., and at a certain rate, say 3-100th an hour, a cautionary signal might be raised, and one of danger whenever the barometer falls at the rate of 5-100ths of an hour in all cases; the nature of the signals to be a question for future settlement.

Under present circumstances, it is submitted that a plan of the kind just mentioned by me would be respected by nautical people, and tend to preserve life and property, especially if such signals were shown by day and by night, if required, by means of lanterns, for it was Admiral Fitzroy's idea, that, in the case of warnings arriving after 3 p.m., they should be shown until late at night. Explanatory rules, if necessary, should be circulated. A writer in the journal which chiefly advocated the signal system, and which proved its national value, inquired, during a discussion upon its merits, "of what use is it to continue to read the barometer to the one-thousandth of an inch, and the thermometer to one-tenth of a degree, year after year, without the practical result gained by Admiral Fitzroy?" This question may now be fairly repeated; and it is for the Society of Arts, to whom I tender my thanks for allowing this discussion, as well as for those gentlemen present who understand the practical bearings of the subject better than I do, to consider the question herein offered for their earnest consideration, and to give independent opinions without favour and without fear—opinions which shall not be confined to this room, but shall be read far and wide, so as to show to the nautical classes of Britain that their welfare is not an object of indifference to the Council and members of this Society.

It has been stated recently, in the House of Commons, that in consequence of memorials from various seaports, including Liverpool, the Government has offered to supply telegraphic signals upon a request being made for that purpose, the expense to be defrayed equally between the contracting parties; yet, it may be that, bearing in mind the contingencies incidental to Government, the system for the present at least would thrive better if carried on irrespective of governmental patronage and aid. Probably, with respect to this part of the question, differences of opinion may be expected to prevail.

DISCUSSION.

Admiral Ommanney said he had heard the paper read with great interest, and he thought it a most valuable one in every point of view, practical and scientific. He trusted that the system adopted by the late Admiral Fitzroy would be resumed; at the same time he thought the department of the Government under which that system was carried out only went half way in what was required. There was, no doubt, great utility in the telegrams that were sent to the coast as warnings to the fishermen, masters of trading vessels, and others who had not received a scientific naval education; but another department was required, devoted to the physical geography of the sea, like that which was instituted by Lieutenant Maury in the United States. We had at present very little knowledge of the motions of the sea, the temperature of the ocean, the currents, &c. We required a department to give special attention to these subjects, and if the results of the researches were tabulated and published, ships would approach our coast with greater caution. The loss of life and property in vessels coming to our shores was probably not greater than that which occurred in vessels outward bound. He concurred with the opinions set forth in the paper, and he hoped they would have the full consideration of the meeting. He was decidedly favourable to the suggestion that barometers should be more extensively furnished to the places on the coast, inasmuch as during the period in which he acted as deputy-comptroller of the Coast Guard he had frequent opportunities of witnessing their utility, and he considered this one of the most practical measures that could be adopted. He thought it very advisable that a regular system of barometric observations should be carried out by the local authorities on our coasts.

Mr. Robert Wilson remarked that the system of storm signalling carried out under Admiral Fitzroy was, he supposed, instituted by the Government for good reasons, and he was at a loss to conceive on what ground they had been induced to discontinue it. If it had been an entire failure, that would, of course, be sufficient ground for its discontinuance; but the Board of Trade, who of course kept records of everything that was done in this matter, had failed to show that the proportion of correct forecasts to those which had failed was such as to justify them in giving up the system. If the Royal Society and the Board of Trade had finally resolved to have nothing more to do with it, he considered it was to the interest of the local authorities in the various seaports to take it up for themselves, in the way which had been suggested in the paper. Various systems had been alluded to on which weather prognostications might be made; but to foretell the state of the weather was one thing; to foretell storms was another. The approach of a great storm was generally indicated by the action of the barometer. He had been in the habit of watching that instrument very closely, and he could say he never knew an instance where the mercury fell half-a-tenth per hour without a great storm following. It might not

happen immediately upon the fall of the barometer, and alternate fall and rise might go on for some time, till some persons might imagine the storm had passed over. But it was sure to come at last. He had noticed that in several instances. He thought if the barometric changes were closely studied, every man might be his own weather prophet. He considered these observations might be carried out by local bodies without the necessity of the Board of Trade distributing expensive telegrams. If, however, the feeling was in favour of a central establishment, such an institution as the National Life-boat Association might employ some one conversant with the matter to telegraph to the coast, as the late Admiral Fitzroy did. Mr. Wilson concluded by making some suggestions for what, in his opinion, would be a more perfect system of lettering the barometer scale.

Capt. J. Selwyn, R.N., said that as in many climates with which he was acquainted the barometer did not rise and fall at all, as in others there were a number of different circumstances affecting the heights of the mercury at which the change from "fair" to "foul" took place, all empirical rules must be applied with reference to the special locality alone to which they were adapted. We need go no further than our own Westmoreland to find an abnormal state of things in this respect, and too much attention could not be given to this point. Admiral Fitzroy had done well in changing the marks on the barometer; he had certainly introduced a much better system. Anything which could mitigate the dangers of the sea was worthy of any amount of scientific inquiry. If one single life were saved, he maintained that the whole of the time and money spent would be well employed. At the same time he was not on the whole displeased that the Board of Trade, as a department of the government, and that the Royal Society, as a great scientific body, should have severally declined to continue to deal further with this question of storm signalling, for, in the case of the Royal Society, its funds were not subscribed for such objects, and in the case of the Board of Trade we had daily experience of the inefficiency of Government to deal with such matters. There were large money interests concerned in this question, and there were the association of Lloyds', and the maritime insurance companies, who might co-operate in carrying out such a system more advantageously than could be done by any Government board. It was asserted that, in many cases, the storms predicted by Admiral Fitzroy did not come, while others came unpredicted; therefore, it was argued, that no reliance could be placed upon such a system of prediction. Was there any new science that had sprung up which, within so short a time, had accomplished such important results with so few failures? Amongst the various reports upon this system quoted in the paper was one from Plymouth, which was not favourable, among many that were favourable, to the utility of the system. On that point he would observe that, as many storms touched Plymouth first, owing to its position, it was extremely probable that a signal which might prove of the utmost value on the north and north-east coasts would be of but little value at Plymouth, because it could not be sent in time to be of any avail. He was happy to see that the secretary of the Royal Society had given such admirable testimony to the truth of the principles which the Society declined to follow up—not because it did not take an interest in them, for that could not be supposed for a moment—but because it was not its province to deal with the matter practically. He would conclude by expressing a hope that this subject would not only receive special attention from scientific men, but would also receive money support from the public, who were so largely interested in the question.

Mr. Varley considered the great number of valuable lives which the system of storm signalling had been the means of saving was a sufficient justification for its continuance, and this could only be done efficiently by a complete system of telegraphic communication around the coast.

Mr. Mayer considered the arguments on this subject had not been put upon a fair basis. They were asked to discuss whether or not the system of storm signalling ought to be continued. His own opinion was that the Board of Trade, having organised a system of that importance, would not have given it up without strong reasons for so doing. It occurred to him that one reason why it was given up arose from the apathy with which the signals were regarded by seamen.

Captain Toynbee said that although he had accepted the appointment of Marine Superintendent of the Meteorological Department, with the object of obtaining more extended meteorological information from the sea, he had nothing to do with the issue of storm warnings, and wished it to be understood that the views he might express on this subject were those of a private individual, and not put forward in an official capacity. As a sailor he had naturally given a good deal of attention to the forecastings of the weather, and it had always struck him that the air which forms our south-west gales was that air which had come over the north-east trades into our latitudes, so that the weather which was first experienced in the south-west of Ireland would subsequently be the weather on the north-east. Therefore it seemed to him that something in the way of foretelling storms might be arrived at. For instance, supposing they took Valentia, then Greencastle, and Nairne, to the north-east, if telegrams showed that a depression had taken place at Valentia, a short time afterwards at Greencastle, and later still at Nairne, this would tend to show that a gale was travelling from the south-west. He drew a diagram, showing how these curves might be recorded for comparison, so that those for a month could be seen in juxtaposition. If these curves did not run parallel during gales, there would be reason to doubt the theory, and another classification of the ports might be taken—say, from south to north, or from west to east. He explained that the same diagrams might be used for temperature, direction, and force of the wind; but for exactness in this work better records were needed than could be collected from men not used to the work, without anemometers and wind vanes.

Mr. F. Gaster said, in witness of the measure of success which attended the labours of Admiral Fitzroy, he might bring forward the reports given in the paper read by Mr. Cooke; the absence of complaint from the different ports of the United Kingdom of the insufficiency of the signals; and last, though far from being least, he might refer to the very severe test which the system experienced at the hands of the committee of the Royal Society. Under those circumstances he thought the success of the system was undoubted. The Board of Trade requested the Royal Society to give their opinion as to the desirability of continuing the system, and the result was that the meteorological department was handed over to that society, which was the first scientific body in the country; and they were at perfect liberty to decline to carry on a system which they considered to be founded mainly on empirical rules. On this the Board of Trade declined to take the responsibility of continuing the storm signals, but what they proposed was that telegrams from various parts of the country should be collected and sent to the outports. He (Mr. Gaster) thought that method would be more efficacious than storm-signals sent from a central place to the various outports. He thought, if the telegrams were sent as proposed, that diagrams should be exposed to public view, showing the direction and force of the wind, together with the height of the barometer at each place. With such diagrams anyone could form his own judgment from the observations thus put before him. All persons present were aware of the very determined manner in which Admiral Fitzroy laboured to perfect his system of signals, but that there were failures occasionally could not be doubted. Con-

sidering, however, the difficulties that had to be experienced in any attempt of this kind, he thought the success attained was decidedly remarkable.

Mr. R. Strachan, as a meteorologist, and having studied the writings of Admiral Fitzroy on this subject, had come to the conclusion that the system was founded upon principles which had been best enunciated by Dr. Buys Ballot. It was impossible, however, under rules so vague and undefined as those which existed, to ask the Royal Society to undertake the task of predicting the weather. If definite rules, like those which guided the periods of eclipses, the rise and fall of tides, &c., were discovered applicable to this branch of meteorology, then he thought the Royal Society might fairly be asked to carry those rules into practice; but not otherwise. That Society having declined to take this task upon itself, a reasonable excuse was given to the Board of Trade for having adopted the same course.

Mr. Pearce, as one who took great interest in the science of meteorology, was decidedly of opinion that the system of storm signalling should be resumed, although he thought it could not be carried out successfully without a central gathering power. It was no use to have different stations on the coast of England without a central collecting body; and when they saw such large sums contributed to the National Life Boat Association for the saving of human life, he thought the system of signalling to prevent men from imperilling their lives on the sea was a question of equal importance. With regard to the adverse criticisms that had been made by the public press and meteorologists on Admiral Fitzroy's predictions and storm signals, he thought it would be agreed that nothing had been advanced sufficient to deter them from the resumption of a system from which much good had resulted. With respect to the rules of Admiral Fitzroy being vague, that was the chief objection raised by the Committee of the Royal Society; but it was to be remembered that this had been the state of all sciences in their earlier stages. He thought those laws which were now regarded as empirical ought not to be wholly disregarded, seeing that they were applied with so much success by Admiral Fitzroy.

Mr. W. H. Bonnewell argued, on the question of the utility and public importance of storm signals being continued by the Government, that if they were of the importance and reliability pointed out by the advocates of the system, an organisation like that of Lloyd's underwriters would be the first to adopt it for their own pecuniary interests, without waiting for any movement on the part of the Government. Under the circumstances, he thought the Government were justified in withholding their sanction to the expenditure of the public funds for carrying out these experiments.

Mr. Lockhart called attention to the fact that from the Imperial Observatory of Paris there was every morning issued, by the head of that institution, the celebrated M. Le Verrier, a sheet map of the whole of Europe, on which the directions and forces of the wind on the previous day were recorded. The temperature and other circumstances of the weather were also given daily in that form. Seeing that these records were sold at a considerable price in this country, the question suggested itself to his mind whether something of the same kind might not proceed from our own Royal Observatory at Greenwich?

The Chairman, in closing the discussion, said it had been generally admitted that the storm signals of Admiral Fitzroy, communicated to the various outposts, had, to a considerable extent, been successful, and had, most probably, been instrumental in saving a large amount of life and property. With regard to the frequency with which they were correct as storm signals only, he held in his hand an extract from the report of the Committee, which had inquired very carefully into the subject. From this it appeared that of a total number of 405 storm warnings for the three years from 1862 to 1865, in the first year 80 per cent. were correct; in 1863-64, 68 per cent. were correct; and in 1864-65, 75 per cent. were correct. With regard to the direction of the wind, only 38 per cent. were right, and 62 per cent. were wrong. It therefore appeared that in the three years, about 75 per cent. of the storm warnings were correct. Whether scientific—whether empirical or not, was it not, at all events, a matter of prudence—a matter of humanity—not to hesitate about the continuance of such warnings? And yet they had been discontinued—and upon what grounds? There were scientific data—that was to say the results of observation; but it was alleged they were not sufficiently numerous or extended to enable a scientific man to arrive at definite results. But this was surely no reason why they ought not to continue these warnings which had been productive of so much good. After all, it could not be said that the science of meteorology was only just now in its infancy. He recollected Humboldt, who was his (the Chairman's) master, giving meteorological data at the end of the last century, laying down normal conditions which, for the tropics, to a certain extent held good. The Greenwich Observatory had records for half a century, made by scientific observers, and with the most carefully constructed instruments; and the same had been done by other bodies, such as the Cambridge, Oxford, and Edinburgh Observatories, to say nothing of the meteorological societies that had grown up within the last 20 years. There were as many as 72 regular observers in Scotland alone, and he believed about the same number in England. So far from not having sufficient observations, the difficulty was that they had too many. The truth was, however, that these observations had been made independently: they had not been brought together and compared. There had been no attempt to deduce normal conditions from the multitudinous observations made. It was not that they now wanted new stations to give them observations with self-recording instruments. If fifty years were not sufficient, how long were they to wait till they could use the results of these observations? Would the next six years be sufficient, when the last fifty years had not been so? As he had already said—these observations of Admiral Fitzroy produced a certain amount of good. As to the direction of the wind, no doubt they failed to some extent, but this could be explained on scientific grounds, into which he would not now enter. Capt. Toynbee had stated his views to the meeting, and these were in truth the very principles on which Admiral Fitzroy had acted. He (the Chairman) had always advocated extended observations not confined to localities. The British isles were far too restricted an area in which to obtain definite observations as to the conditions of atmospheric changes. The origin of these changes was far beyond that area. The great wave of pressure last year came from Shanghai, in China, where the barometer was at 31 inches, gradually progressing towards Europe, and travelling to America in a period of about seven weeks, as far as Montreal, when the barometer stood at 30 inches there. These were indications of atmospheric movements not over a space of 600 miles, but over the vast space of 16,000 miles. On the other hand, he had known instances of as great atmospheric disturbances as that he had mentioned occurring within so small a distance as 200 miles, in India. He had known the barometer to stand at 20 inches at Malabar, while at Coimbatore, only about 100 miles distant, it was at 30 inches. As he had said, he had always been an advocate for international observations, and he fully appreciated what was done in that respect in Paris by M. Le Verrier, as mentioned by the last speaker. Those daily bulletins were of the greatest scientific value. But this was not done in France alone, but was carried out throughout the whole of Europe—in Berlin, in Italy, in Holland, and in Russia an organised system of observations prevailed. He had a letter from the Secretary of the Meteorological Society of Scotland, expressing his deep regret and that of the

fishermen along the coast at the discontinuance of these storm signals. With regard to the daily meteorological observations published in the *Times*, he would say it required the experience of many years, and a considerable knowledge of meteorology, to be able to turn them to any practical account. With regard to the cost of carrying out the new system proposed, applying it to such a place as Leith, it would amount to about £60 per annum, half of which the Government offered to pay, but the town of Leith refused to pay the other half. It was suggested that an expert might be engaged at each station at £20 per annum, though what kind of expert could be had for that salary he was at a loss to conceive. This would bring the cost of the several stations proposed to about £1,600 per annum for the twenty daily communications, out of the pocket of the country. The establishment had already cost £10,200, in addition to £2,500 at starting. Observers in England would be aware that, circumstanced as we were with regard to the Atlantic, the wind blew from a westerly point 300 days out of the 365 days of the year; therefore, as far as England was concerned, we had the advantage of that normal condition apparently. It was remarkable that with a westerly wind, which came from a dry climate —such a one as we had had during the last week— the barometer stood very high. The wind gradually rose till it amounted to a gale, and there would be no indication of it on the barometer. That was also the case with the wind from the north; but with the winds from the other points of the compass, they had not that difficulty, and there was a greater chance of safety in the predictions. Considering the advantages which had already resulted from the storm signals of Admiral Fitzroy, and the practical inutility of the proposed system of observations confined to a few stations, he could not but hope that the Council of the Society of Arts would take the subject up, and express their opinion on it to the Government. The council of the Meteorological Society of Edinburgh had already done so, and they would see in a few days returns on the subject which would be published as a parliamentary document. Those returns would be made from Liverpool, Dundee, Edinburgh, Manchester, and many other places, and they would find there was an almost universal feeling in favour of the continuance of the system of storm signals. The Chairman concluded by moving a vote of thanks to Mr. Cooke for his paper.

The vote of thanks was then passed and acknowledged

PARIS UNIVERSAL EXHIBITION.

Scarcely four weeks separate us from the opening of the exhibition, and every day exhibits signs of increased energy and advancement. It will be satisfactory for those at home to know that the British section is not in arrear of its neighbours, in fact, taking everything into account, perhaps the English portion is more advanced than any other, with the single exception of Russia; the slow conveyance of goods from the coast is apparently the only circumstance which prevents still more rapid progress. If this be altered, there is little doubt that the British machinery court will be completely arranged by the opening day; if not, there will probably be large gaps, for which the French railway will be responsible. Unfortunately, this railway difficulty tells specially against England, the channel ports being invariably choked up when there is any important addition to the ordinary work.

The fears and doubts that have been expressed regarding the opening of the exhibition, or the condition in which it will open, never had foundation in fact. It was always intended that it should be opened on the 1st of April, and I do not imagine that it was ever for an instant contemplated to make any change in that respect.

The condition of the building is of course an important element in the case, and it is but fair to the Imperial commission to say that not only the stone and iron work, but also the glazing, painting, and flooring were all completely finished to time, that is to say, the progress of no portion of the exhibition has ever been impeded by the workmen engaged on the building itself; and to this fact may be added another, namely, that the floor is substantial and well laid, thus presenting a striking contrast with former exhibitions.

The grand vestibule is now being paved, and is probably finished at this moment, and before long its clerestory windows will be filled on one side with French, and on the other side with English stained glass; this vestibule forming the demarcation between the two countries.

Thanks to the change in the weather, the grounds are much improved in condition, and the main roads are becoming firm and hard; moreover, as the heaviest traffic is taken by the service railway, the roads have a fair chance of becoming consolidated. The service within as well as without the building is of immense use, and at the present moment there are three steam traversing and other cranes at work in the British department alone.

Even should the dry weather not continue, those who visit the Exhibition may now do so with perfect ease; the roofs forming the carriage entrance on one side of the grounds are completely finished, with the exception of decoration, and the roads beneath laid with asphalte, so that the entrance way is perfectly sheltered. The covered way, on the opposite side of the grounds, for those who arrive by railway, is also nearly completed; but the branch railway is not yet thrown open for passenger traffic, probably for fear of interrupting the goods service.

The further the preparations proceed the greater is the contrast between the British and the other portions, and especially the French section, of the exhibition; in the latter, not only are nearly all the courts covered with awnings, but the whole of the main avenues also, and that at no great height from the floor, so that the French and other industrial courts have the appearance of a series of narrow arcades, with back shops; in the English department, on the contrary, although a considerable number of large cases and stands are erected, they do not hide each other, and each has some distinguishing feature. But the course taken with regard to sun-blinds has produced a still more marked contrast. There will scarcely be any canopies in the whole of the English section, and instead of awnings, the Commission is placing a blind beneath each of the lights in the roof. These blinds have a small diaper pattern, and an ornament in the centre, containing, alternately, the insignia of the three kingdoms, of India, and the colonies, and, being carefully stretched and fixed to the woodwork, have a very neat and finished appearance. The awnings in the other portions of the building are, at present, brilliantly white, with gay coloured borders, while the English blinds seem to be unbleached; but, while the former offend, the latter please the eye. Thus, the whole British department is not only as free and open as possible, or nearly so—for there is one long wooden wall which interferes with the rule—but the ventilation is left without the slightest impediment overhead, an advantage which visitors will certainly appreciate highly four months hence.

Art manufacture promises to be better represented than usual in the British department. Besides the English house in the park, and the reproduction of portions of the South Kensington Museum, the progress of which attracts great attention, the terra-cotta columns of the building which is to surmount the boiler-house are now being erected, and look very graceful; and the art-manufactures court is taking shape under the care of Mr. Wood. There is no doubt that the specimens of ecclesiastical and general decoration will reflect credit on this class of exhibitors, amongst whom are the well-

known names of Blashfield, Pulham, Hart and Son, Harland and Fisher, Hardman, Jones and Willett, the Architectural Pottery Company, of Poole, Clayton and Bell, Maw, Skidmore and Minton.

The preparations in the Indian court are well advanced; the cases are all up and glazed, but they are sadly crowded, and even as they are there is said not to be nearly room enough for the collection.

The British colonies are also beginning to make themselves seen, under the care of Mr. P. L. Simmonds and some local representatives; but here the want of space is as usual the grand difficulty, and Australian natural history has migrated into the machine court. The birds are very beautiful, and would have formed such brilliant decorations elsewhere that it is a great pity to see them placed where they are. There is a want of fitness here which is disagreeable to the senses.

A musical section has been formed, and the art is to be represented from the triple point of view of composition, execution, and history. The following is the list of the committee for composition:—MM. Rossini, honorary president; Auber, president; Berlioz, Carafa, Félicien David, Georges Kastner, General Mellinet, Mermet, Prince Poniatowski, Reber, and Ambroise Thomas; Verdi and Gounod, secretaries; Lépine and Norblin, assistant-secretaries.

The ministers who are vice-presidents of the Imperial Commission, namely, the Ministers of State, of Agriculture and Commerce, and of the Fine Arts, announce officially that they will receive the members of the commission, and committees, jurors, and officials, foreign as well as French, on alternate Saturdays, commencing with the 9th inst.

Foreign functionaries must be presented by the commissioners of their country.

Fine Arts.

Collective Exhibition of Ingres' Works.—This exhibition is announced to open earlier than was originally intended, namely, on the 1st of April; and it is expected that a large number of the most famous works of the painter, especially those of his latter period, will be collected.

Bust of the late M. Cousin.—The Emperor has commissioned Mr. Munro, the Scotch sculptor, to execute a bust of M. Cousin for the French Academy. Mr. Munro commenced the portrait of the deceased at Cannes, and took a cast of the face after death.

Commerce.

Imports of Cotton.—The imports of cotton last year were very nearly as large as in the great year 1860. Thus the receipts of raw cotton in 1866 amounted to 1,377,129,936lbs., as compared with 977,978,288lbs. in 1865; 893,304,720lbs. in 1864; 669,583,264lbs. in 1863; 523,973,296lbs. in 1862; 1,256,984,736lbs. in 1861; 1,390,938,752lbs. in 1860; 1,225,989,072lbs. in 1859; 1,034,342,176lbs. in 1858; and 969,318,896lbs. in 1857.

Colonies.

Land Tenure in New South Wales.—The eminent success (says a Sydney paper) that has attended the practice of free selection by small holders of land whenever the principle has been allowed unrestricted operation, has brought into greater contrast the desolating effects of the pastoral system as at present encouraged. The freehold cultivator converts his land into a productive garden, while the leasehold squatter suffers it to remain, for all purposes but those of feeding stock upon the natural grasses, a dreary wilderness. The constant answer to reproaches of this kind is that the squatters would improve the land if the legislature would give them secure and perpetual possession; and strangely enough this one-sided mode of reasoning finds supporters in persons who ought to be amongst the first to perceive its hollowness and injustice. There is no reason whatever why the public land should be secured to the present occupants. For twenty or thirty years, in some instances, those lands have been shut up from general competition, and the time is fast approaching when the public will insist upon its termination. When that time arrives, the true wealth of Australia will, for the first time, become generally known to the world, and prosperous farms and a numerous contented yeomanry will occupy the places of desolate sheep walks and scattered and migratory adventurers.

Leasing of Land in Queensland.—The Queensland Parliament have passed a bill called the Leasing Bill. A great bar against the occupation of land appears to have been the sum demanded by Government as purchase money—£1 per acre. The purchaser was also compelled to fence in all the land within two years from the date of purchase, if taken for agricultural purposes. The new leasing bill enables the man who desires to take up land for any purposes, to do so on easy terms, and the condition of fencing the land is no longer insisted upon. Many persons would have desired the introduction into the bill of a clause making the clearing and cultivation of a certain portion of land one of the conditions of leasehold. This, however, was strenuously opposed by the squatters, who also endeavoured to have fencing made a condition binding on the leaseholder; in this latter point, however, they were defeated. The bill is a compromise, the squatters having yielded to the agriculturists the right to lease land on easy terms, but they have, at the same time, taken care so to frame the Bill that they will themselves be able to make use of this liberality without being obliged to devote any of the land to agricultural purposes.

Correspondence.

The Cab Question.—Sir,—Referring to the paper read, and the letters that have appeared in the *Journal*, respecting the street cabs of London, will you allow me to offer a few remarks. First, with respect to the cab fare. When the fare was settled at 6d. per mile, the proper method was arranged for settlement of disputed fares by the establishment of a book of fares, published "by authority." Now, there is no doubt that this is the proper way of settling this difficult point; but no sooner was the book of fares published than "cabby" found out the wrong fares in the book, and employed his friends to ride about in his cab and pay him the fares according to the book. Cabby summoned the rider, and had the distance measured, proving the book wrong; and this was repeated in so many instances of mistakes in the book, and at so many different police-courts, that the magistrates said the book could not be depended on, and so it has remained practically useless since. Now, the principle is a sound one, and the best and simplest reference in case of a disputed fare; and, in any fresh legislation on the subject, the book should be made "infallible," in this way: Every care should be taken in its compilation, but a clause should be inserted in the act relating to cabs that, for all the purposes of reference in case of disputes, the book published "by authority," whether right or wrong, should for the time being be held to be "infallible" and past question, and magistrates and police should be bound to enforce its decrees. After six months it should be revised, and a new edition published, with all its errors rectified (if any), and so on as often as required, the latest edition to be binding

on driver and rider for the time being. Secondly, as it is doubtful if the present fare of 6d. per mile will be continued, the book should show the distance in miles and fractions of miles, carrying change of fare. If the legislature fixes the fare (although on this point I am rather diffident), perhaps a fair sum between the cabman and the public would be 1s. for one mile and under, 9d. per mile from one mile to three miles, and 6d. per mile for all distances of three miles and upwards, the extra persons to be paid for and luggage as at present; but decidedly the law should allow a better class of vehicles to be licensed to carry passengers at a higher fare, such fare to be at the option of the owner of the vehicle, who would fix a rate which, while it would pay, would also induce the public to engage and use these conveyances freely. It has always seemed strange to me, seeing the extent of our parks and the beautiful drives we have in the immediate vicinity of the metropolis on all sides, that we have not plenty of open carriages plying for hire, as they do in Paris, to convey people for a moderate sum to the various points of interest or beauty within an easy drive of the bridges or the parks. Thirdly. Now I come to the principal reason that induced me to write this letter. We all of us know what a noble street we have in Holborn above Middle-row and Oxford-street, and how completely it is disfigured, and, for purposes of rapid and continuous traffic, how entirely it is ruined by the string of cab-stands, cutting up a fine wide thoroughfare into two narrow streets, offending the eye with its ricketty vehicles, the nose with its animal excretions, and the ear and the moral sense with its foul language. It is a disgrace to London that a cab-rank should be allowed to block up and hinder the traffic in its streets for a single day; and the remedy is so simple and so beneficial for all parties concerned—for the men, for the horses, and the cabs. They should be housed in stables, in the side streets, and kept manned and harnessed, only so many as required. The "waterman" should be stationed in the main street, in a box, with a red lamp lighted after dark, and a large number (the number of his station) printed on it. He should have an alarum communicating with the stables, and when a cab was wanted he should give, say, one pull for a four-wheeler, two for a hansom, and three for a superior vehicle; and, while the cab was coming, he should give a ticket with the number of his station to the hirer, ask him his destination, and, referring to his book, tell him the fare. In case of dispute at the end of the drive, the ticket would show the hiring-station. The whole arrangement should be placed under the care of the Metropolitan Board of Works, and the watermen should be efficient men, sworn in as constables, quite independent of cab-owners and drivers, and have a certain amount of control over them. There is no doubt that at present the cab-driver is dissatisfied, and the public is not well served, and therefore some change would be desirable for all parties.—I am, &c., A Member of the Society of Arts.

The Government and the Telegraph.—Sir,—On the subject of telegraphy forming a part of our postal system, I hold nearly the same views as those set forth in the very able paper read last week by Mr. E. Chadwick. But there is one question of great importance, upon which (since it cannot be gathered from his paper) I shall, and probably many others will, be glad if that gentleman will state his opinion. Does he think that, either at the present time or in future years, it will be for the public benefit to prevent the dispatch of telegrams by private enterprise? or, in other words, would he wish the Government to monopolise the use of electricity for the purpose of conveying information of public importance, and of making our business or social arrangements? I cannot but think that any such monopoly ought not to be conceded; nor should we argue that because the post-office has given great satisfaction in its present capacity of administration only, it must be equally successful when it is called upon to undertake extensive and varied duties of construction. At any rate, the Government telegraph is likely to be more efficiently managed, and the adoption now and hereafter of the quickest and most correct means of telegraphic communication will be best assured by there being no prohibition of wholesome competition on the part of private companies. If it is asked, "What chance will a private company have in competition with the postal telegraph?" the undeniable force of such a question supplies the best argument in favour of there being no monopoly, viz., if the Government telegraph always keeps up with the public requirements, and avails itself of the best systems, it will have nothing to fear from any competition. The commercial success of any private company, its property being subject to local taxation, &c., &c., could be brought about only by want of care and capacity for adaptation on the part of the Government telegraph free from such heavy imposts. The public can gain nothing, but may lose much, by giving to the Government a telegraphic monopoly. Another thing to be considered is, that if the public grants no such monopoly, it follows that existing companies will not be—as they ought not to be—compelled to sell their rights and properties; and, if the shareholders of the different companies are not pleased with the Government offers for their lines, they can, and probably will, amalgamate their interests, thereby greatly diminishing the annual expenses, whilst they augment the efficiency of their working arrangements. —I am, &c., J. Hawkins Simpson.

March 5.

The Position of Inventors at the Paris Exhibition.—Sir,—As there existed some doubts as to the position of inventors exhibiting at the forthcoming Paris Exhibition, a letter of inquiry as to certain points was directed to the Minister of Agriculture, Commerce, and Public Works, by my correspondent, Mr. Dufrené, at Paris, to which the following is (the translation of) the reply, which you will no doubt consider of sufficient interest for insertion in your *Journal*.—I am, &c., L. de Fontaine Moreau, Patent Agent.

4, South-street, Finsbury, E.C., 26th Feb., 1867.

(Translation.)

"Ministry of Agriculture, of Commerce, and Public Works,
"Paris, 21st February, 1867.

"Sir,—I have received the letter which you addressed me on the subject, first, of the importation, in view of the Universal Exhibition of 1867, of articles manufactured abroad and protected in France by a patent; and, secondly, of the protection concerning the rights in the inventions of exhibitors. On the first point, it is certain that foreign manufacturers with patents in France, who wish to introduce similar articles for exhibition, must first apply for authority from my Ministry, pursuant to the law of the 31st May, 1856, in order not to lose their patent rights. On the second point, there has appeared to be no objection to proceed in a similar manner to that of 1855. In consequence, a Bill has been drawn up to authorize the delivery of Certificates of Protection, and there is ground for hoping that its adoption will not meet with any difficulty.—Receive, sir, the assurance of my consideration.—The Minister of Agriculture, of Commerce, and Public Works (signed), Forcade."

MEETINGS FOR THE ENSUING WEEK.

Mon.....London Inst., 7. Mr. Macfarren, "On the Origin and Development of the Lyrical Drama."
R. Geographical, 8½. 1. Admi. A. Butakoff, "The Delta and Mouths of the Oxus." 2. Lieuts. Smith and Harrison, "A Journey to the Sources of the Sutlej."
British Architects, 8.
Society of Arts, 8. Cantor Lecture. Mr. John Hullah, "On Music and Musical Instruments."

Tues ...Medical and Chirurgical, 8½.
Civil Engineers, 8. Discussion upon Captain Tyler's paper, "On Steep Gradients and Sharp Curves on Railways;" and (time permitting) Mr. W. A. Brooks, "Memoir on the River Tyne."
Photographic, 8.
Ethnological, 8. 1. Mr. J. Lamprey, "A Contribution to the Ethnology of the Chinese." 2. Hon. George Campbell, "On the non-Hindu Tribes of the Borders of Hindustan."
Royal Inst., 3. Rev. G. Henslow, "On the Practical Study of Botany."

Wed ...Society of Arts, 8. Mr. Clements R. Markham, "On the Tinnevelly Pearl Fisheries."

Graphic, 8.
Microscopical, 8. 1. Mr. W. W. Whitney, "On the Changes which accompany the Metamorphosis of the Tadpole, in reference especially to the respiratory and sanguiniferous systems." 2. Dr. Mackintosh, "On a Gregarine form Parasite." 3. Mr. Lobb, "On a New Form of Paraffine Lamp."
Literary Fund, 2. Annual Meeting.
R. Society of Literature, 4½.
Archæological Assoc., 8½.
THUR ...Royal, 8½.
Antiquaries, 8½.
Zoological, 8½.
Syro-Egyptian, 7½. Mr. Bonomi, "On the Harmony between the Mosaic and Egyptian Cosmogony."
R. Society Club, 6.
Royal Inst., 3. Prof. Frankland, "On Coal Gas."
FRI .....Philological, 8.
Royal Inst., 8. "On the Traces of the Early Mental Condition of Man."
Statistical, 4. Annual Meeting.
R. United Service Inst., 3. Lieut. H. M. Hozier, "The recent Campaign in Bohemia."
SAT .....R. Botanic, 3½.
R. Inst., 3. Prof. Frankland, "On Coal Gas."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 25th February, 1867.

32. Bills—Land Contracts (Ireland).
38. ,, Sale and Purchase of Shares.
42. ,, Church Rates Regulation.
51. ,, Counsel to the Secretary of State for India.
6. Witnesses (House of Commons)—Return.
11. Municipal Boroughs (England and Wales)—Returns.
22. Public Debt—Account.
58. Greenwich Hospital and School—Estimate.
72. Freemen—Return.
74—56. Municipal Rates and Franchise Acts—Lords' Report (1859).
77. Civil Services—Statement of Excesses.
78. Committee of Selection—First Report.
82. Boroughs (England and Wales)—List.
Education—Revised Code.
Public Petitions—Third Report.

Delivered on 26th February, 1867.

33. Jamaica—Extracts of Correspondence on the Conduct of Military Officers.
60. Ecclesiastical Establishment (West Indies)—Return.
67. Elections—Return.
69. Terminable Annuities—Account.
73. Railway and Canal Bills—First Report.

Delivered on 27th February, 1867.

36. Navy (Education and Religious Denominations)—Statistical Return.
51. Bunhill-fields Burial Ground—Correspondence.
76. Queen Anne's Bounty—Account.
80. Public Health and Local Government Acts—Returns.
Lancaster Borough Election—Report of Commissioners.
Public Petitions—Fourth Report.

SESSION 1866.

524. Union Assessments—Return.

Delivered on 28th February, 1867.

47. Bills—Court of Chancery (Ireland).
52. ,, British North America.
53. ,, Attorneys', &c., Certificate.
54. ,, Hypothec Abolition (Scotland).
55. ,, Metropolitan Improvements.
56. ,, Thames Embankment and Metropolis Improvement (Loans).
58. ,, Trades' Unions (amended in Committee).
35. Metropolitan Board of Works—Account.
37. Naval Prize Money, &c.—Account.
68. Church Rate Bills—Return.
78. (1.) Committee of Selection—Second Report.
Education (1867)—Revised Code (corrected page).
Fortifications (Dockyards, &c.)—Report respecting Progress.

Patents.

From Commissioners of Patents' Journal, March 1st.

GRANTS OF PROVISIONAL PROTECTION.

Advertising—3443—J. H. Johnson.
Axles, mounting wheels on—377—C. W. Dixon.
Bricks—403—W. Clark.
Bricks, &c.—151—R. Kunstmann.
Cisterns, regulating the supply of water to—383—G. H. Kidd.
Embankments—387—E. Manico.
Fancy weavings, producing—373—E. Heywood and E. Hincheliffe.
Fibrous materials, preparing, &c.—216—J. Taylor.
Fire-arms, breech-loading—222—J. W. P. Field.
Fire-arms, breech-loading—355—W. Kilbee.
Fire-arms, breech-loading—395—F. Bacon.
Fire-arms, ordnance, and projectiles 399—A. J. Paterson.
Flax, &c., pulling—228—G. Haseltine.
Games—180—T. Taylor.
Gas burners—363—D. N. Defries.
Grain, cleaning—405—S. D. Mack.
Hats, &c., pressing and shaping—345—S. Howard.
Horse shoes—381—R. B. Mulliner.
Hot water, heating with—349—H. K. York.
Iron piles and columns—401—J. Westwood and R. Baillie.
Leather straps, &c.—357—M. J. Haines.
Matters, preserving—379—W. Clark.
Metals, boring and planing—361—H. A. Fletcher.
Motive power—393—W. Clark.
Nails and spikes, forging—271—D. A. Halket.
Photographic portraits, taking—407—W. E. Newton.
Piled fabrics, finishing—3194—J. M. Worrall.
Rag-grinding machines—3378—J., W. S., and J. Rhodes.
Railway level crossings, gates on—369—G. Daws.
Saws—351—W. Clark.
Self-acting safety gun locks—367—J. Stanton.
Slide valves—343—W. G. Beattie.
Spelter—337—J. Graham.
Steam engines—397—H. H. Grierson and J. McElroy.
Steam, generating—375—J. Bührer.
Steam rollers—347—W. T. Carrington.
Type, locking up—353—W. Conisbee.
Vegetable substances, treating—385—W. E. Newton.
Vessels, drawing liquids from—409—H. A. Davis and S. J. Salkeld.
Vessels, &c., propelling—3262—R. B. Boyman.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Boat-detaching apparatus—464—G. Haseltine.
Files—465—W. R. Lake.
Furnaces, consuming smoke in—454—W. Harrison.
Gas, letting on, &c.—463—G. Haseltine.

PATENTS SEALED.

2161. J. A. Coffey.
2178. J. Booth.
2257. R. Frost.
2267. E. Russ & H. & E. Hammond.
2269. E. Nelson.
2272. C. Reeves.
2275. G. Lowry.
2276. E. Farr and I. Gregory.
2277. W. T. Sugg.
2278. T. G. Webb.
2283. H. Robins.
2285. A. V. Newton.
2292. J. Bullough.
2294. T. Berney.
2296. C. D. Abel.
2301. C. Defries.
2306. E. T. Hughes.
2311. C. Hodgson and J. W. Stead.
2314. C. T. Burgess.
2315. F. Warner, W. Stewart, and G. W. Barber.
2336. W. E. Gedge.
2503. E. B. Bigelow.
2622. J. Syme.
2710. E. B. Bigelow.

From Commissioners of Patents' Journal, March 5th.

PATENTS SEALED.

2288. W. Cuthbert.
2293. G. V. Fosbery.
2295. A. H. Hart.
2297. J. and J. W. Asquith.
2308. C. Catlow.
2312. C. E. Brooman.
2351. W. Clark.
2373. T. Newey.
2383. E. Wall.
2392. J. Thompson.
2406. E. Barlow and W. N. Dack.
2428. R. Richardson & J. Imray.
2436. I. Dimock.
2680. H. Kessler.
2769. N. H. Loomis.
2770. N. H. Loomis.
3273. C. E. Brooman.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

497. F. Weil.
515. E. T. Hughes.
541. G. P. Harding.
547. W. E. Newton.
505. S. Cooper & J. M. Worrall.
504. J. Chapman.
527. G. Gaze.
532. J. Wright.
550. M. Henry.
671. W. S. Longridge.
551. S. Bourne.
552. A. Manbré.

PATENT ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

527. T. Silver and J. Hamilton.
546. G. Weir.
578. H. Bessemer.
600. J. H. Johnson.
589. W. G. Ramsden.

Registered Designs.

The Notched Fire-place—February 5—4841—L. Banks, 36, North-street, Hackney.
Screw-wrench or Spanner—February 11—4842—J. Asbury, Balsall-heath, near Birmingham.
Bracelet Closer—February 18—4843—T. Davison, 2, Poland-street, Oxford-street, W.
A Coat-pocket—February 27—4844—S. Lichthem, 40, York-street, Cheetham-hill-road, Manchester.
A Portable Bookstand, with Slide Holder—March 4—4845—J. A. Fussell, 45, Woodstock-street, Birmingham.

Journal of the Society of Arts.

FRIDAY, MARCH 15, 1867.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'Clock :—

March 20.—"On Successful Oyster Culture." By Harry Lobb, Esq.

March 27.—"On Flax, and Improved Machinery for its Preparation." By Chas. F. T. Young, Esq., C.E., Memb. Soc. Engineers, Assoc. Inst. N.A.

Cantor Lectures.

A Course of Lectures "On Music and Musical Instruments," by John Hullah, Esq., is now being delivered as follows :—

Lecture III.—Monday, March 18.

Musical Expression. — Definition — Difficulties of Musical Composition—Realization of Unheard Effects —The Perfect Cadence—The Renaissance—Imitation—Expression, False and True.

Lecture IV.—Monday, March 25.

Musical Notation.—Different Systems, Alphabetical and Special—Neumas—Accents—Lines and Spaces —The Time Table—Modern Notation; its Origin and Growth, Simplicity and Fitness.

Lecture V.—Monday, April 1.

Musical Instruments.—Classification—Wind Instruments—Stringed Instruments—The Plectrum, Hammer, and Bow—Instruments of the Ancients—Mediæval Instruments; their Introduction into the Church.

Lecture VI.—Monday, April 8.

Musical Instruments (*continued*).—Modern Instruments—Chamber and Orchestral—Combination — The Modern Orchestra—Conclusion.

The lectures commence each evening at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend to each lecture.

Examinations, 1867.

In addition to the prizes announced in the Programme of Examinations, the following are offered :—

The Worshipful Company of Coach and Coach Harness Makers offer a prize of £3 in Freehand Drawing, and a prize of £2 in Practical Mechanics, to the candidates who, being employed in the coachmaking trade, obtain the highest number of marks, with a certificate, in those subjects respectively.

The Worshipful Company of Goldsmiths offer three prizes—of £5, £3, and £2 respectively—to the three candidates who, being employed on works in the precious metals in any part of the United Kingdom, shall obtain from the examiners the first, second, and next highest number of marks, such prizes to be distinguished as the "Goldsmiths' Company's Prizes."

Subscriptions.

The Christmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Food Committee.

The Sub-Committee on Milk met on the 6th inst., at 10.30. There were present—Lord de l'Isle, in the Chair; Mr. Caird, Mr. Harry Chester, Mr. Clare S. Read, M.P., and Mr. Ludford White. The Committee settled the particulars of letters to be written to the following railway companies requesting information respecting the supply and transit of milk :—The Great Eastern, the Great Western, the South Eastern, the South Western, the London and North Western, the London, Chatham, and Dover, the London, Brighton and South Coast, and the Great Northern. Lord de l'Isle read a memorandum, drawn up by Mr. Sturgess, on the subject of cowkeeping for the working classes in the north of England; and communications on that subject were read from Mr. J. C. Morton, who was unable to attend the Committee, and others.

The Baroness Leisner-Ebersberg had sent a sample of "Liebig's Concentrated Milk for Infants," prepared for the "Infant Food Company" by Mr. Mullen. This preparation, she said, was stated by Professor Liebig to be a perfect chemical equivalent for woman's milk.

Various other matters were discussed, and the Committee adjourned to Wednesday next, at 10·30.

The Sub-Committee on Meat met on Wednesday, the 13th instant. Present—Mr. Harry Chester, in the Chair; Messrs. C. S. Read, M.P., E. Wilson, F. Parish, C. Wren Hoskyns, James Ware, and J. Ludford White.

Samples of a large quantity of Australian beef, preserved by Mr. Tindal, were laid before the Committee. It was stated that this was now on regular sale, at 7d. or 6d. a lb., according to quality.

The following memorandum, by Dr. Thudichum, on the use of "Liebig's Extract of Meat," was read :—

Liebig's extract of meat may be substituted for, or used in conjunction with, beef tea in the following manner:—A quantity of the extract, containing the soluble constituents of 2lbs. of fresh meat, when dissolved in three pints of boiling water, makes good strong beef tea. Salt has to be added to taste. Flavouring ingredients and

spices may also be added with advantage. Beef tea is ordinarily made thus: A quantity of meat (mostly from the leg of the ox), say 2lbs., is chopped or cut small, and put on with five pints of cold water. It is then heated to boiling, and the scum which rises taken off. It is further boiled down* to three pints, and the liquid strained from the meat residues. The latter are now in such a condition that human beings refuse to eat them, and cats and dogs will eat them only under the compulsion of great hunger, or with the addition of a little salt.

If 2lbs. of beef, or their soluble constituents in the shape of Liebig's extract, are used to make three pints of broth, a beef tea results, which is as strong as ought ever to be used. For some persons and some purposes the three pints may, with advantage, be diluted to four.

Liebig's extract is free from fat and gelatine; the beef tea made in our kitchens contains both. Careful cookery prescribes the removal of the fat from beef tea or gravy soup, but the gelatine is not by any means excluded. On the contrary, much of our gravy soup, or light thin soup so-called, consists of "stock," which is mainly a decoction of all kinds of bones resulting from culinary operations.

This gelatine adds a trifle to the nutritive value of the gravy, but injures its taste; it hangs gluey or sticky about the lips. It is the less objectionable the larger the proportion of actual extract of meat, or decoction of meat (real beef tea) that is mixed with it. It is by no means a necessary ingredient of good beef tea or gravy soup.

There is one clear gravy soup, containing gelatine only, known in the art of cooking, namely, the "soupe maigre," from the drum-sticks or tarsal bones of fowls, so pathetically described by Beauvilliers, in "L'Art du Cuisinier;" but this is actually only a curiosity.

If Liebig's extract contained fat it would not keep, but become rancid; if it contained gelatine, it would be impossible to estimate its value as compared to the best beef tea; for the best dry gelatine being only half the price of extract of beef, its admixture would depreciate the extract; and as the amount of gelatine in the extract would, or might be, variable, and could in no case be determined, the value of the extract would be uncertain, and it could not be bought or sold as it can now, by the standard of the meat-weight, which a given quantity of it represents.

In my opinion Liebig's extract will be more generally useful in the following cases:—

1. As an aid to cookery in houses of the middle classes, managed with intelligence.

2. As an aid to cookery in hotels and eating-houses of all descriptions.

3. As a ready means for producing quickly a nutritive, easily digestible, and tasty soup for great numbers of persons, under circumstances where elaborate cooking is impossible. Thus, for soldiers on the march, in camp, or even in barracks, for mariners on board ship, for patients in hospitals, for the recipients of charity in soup-kitchens, for the poor in workhouses and asylums, for prisoners in jails, and for children in schools, orphanages, refuges, &c., good soup can be prepared quickly by dissolving the necessary quantity of the extract in boiling water, and pouring this over bread, or toasted bread.

Any ordinary soup, made with water and with ingredients such as peas, rice, potatoes, &c., and even with lumps of meat, may be greatly improved by the addition of a suitable quantity of the extract. One teaspoonful of the extract dissolved in a quart of the ready-made soup, would make it of the same beef-tea strength as is ordinarily used in good household soups of the middle classes.

But the extract will probably remain inaccessible to the poorer classes in general, for the following reasons:—

(*a*.) Because the extract cannot be retailed conveniently in quantities adapted to daily wants, and because its viscid nature makes its sub-division and distribution, without material loss, very difficult.

(*b*). Because in warm weather it has to be stored in a cool larder or cellar, to prevent it from becoming putrid.

(*c*.) Because its use presupposes a certain knowledge and intelligence on the part of the person charged with its preparation, without which great waste would be certain to result.

* This boiling down is not necessary when Papin's digester is used. In that case the exact amount of water is added, and the pot closed.

Note by Mr. Harry Chester on the foregoing Memorandum.

The extended use of *Extractum carnis*, as the beefy element of soup, may have an important bearing on the general question of supplying meat for the masses of the people; because the *Extractum* thus used is for the most part brought from South America and Australia, and is substituted for the British beef which would otherwise be consumed in the making of stock.

Deputation to the Royal Agricultural Society.

A deputation from the Council of the Society of Arts, consisting of Mr. Harry Chester, Vice-President, Mr. D. Roberton Blaine, Mr. G. F. Wilson, F.R.S., and the Secretary, met a deputation from the Council of the Royal Agricultural Society, consisting of Mr. Thompson, the President, Mr. Dent, M.P., Mr. C. S. Read, M.P., Mr. S. B. L. Druce, with the Secretary, on Thursday, the 7th inst, in order to seek the co-operation of that Society in promoting the education of the working classes engaged in the cultivation of the soil.

Mr. Chester explained the system of examinations instituted by the Society of Arts, and said that the object the deputation had in view was to ask the Royal Agricultural Society to exert its influence for the improvement of primary education among agricultural labourers, and to induce the higher class of such labourers and mechanics to avail themselves of the advantages offered by these examinations.

After a conversation, Mr. Thompson expressed, on the part of the Council of the Royal Agricultural Society, their willingness to consider what could be done to aid the Society of Arts in this matter, and promised that the subject should receive their most favourable consideration.

Sir Thomas Phillips, Chairman of the Council of the Society of Arts, was prevented from attending by indisposition.

Cantor Lectures.

"On Music and Musical Instruments." By John Hullah, Esq.

Lecture II.—Monday, March 11th.

Melody, &c.

Mr. Hullah began his second lecture by referring to a statement he had made in the first—that music and noise, however different practically, were but degrees of the same thing. Something of the same kind is true of melody and harmony, seeing that no close consideration

of the nature and properties of the one is possible without continual reference to the other. No doubt it is convenient to distinguish them, but not to say that pure melody is impossible, seeing (as was shown in the first lecture) that a single sound can only exist for an instant, every melodious progression is good or bad in so far as it conforms to some principle of harmony, and every harmonious progression is good or bad in so far as the individual sounds of which it is composed move with freedom and propriety. A single chord is an example of harmony only, but when we follow it by another chord we introduce melody. He had often been asked, "Does a musician, in composing a song, for example, make the tune first and the bass and other parts afterwards, or how?" The process of musical, like every other kind of composition, is difficult to analyse or describe, but probably, whatever may be the practice with others, educated musicians always simultaneously conceive whatever is to be simultaneously executed; and some plan and finish large sections, and even whole movements, by a single effort. Mr. Hullah alluded to another statement he had made in his first lecture—that the presence of two notes of the natural scale was the characteristic of modern music; and that unless these two notes were found in occasional juxtaposition, no idea of a key or scale, in the modern sense of those words, was possible. Also, that music deficient in the juxtaposition of these two notes, whatever might be its other merits, was, in comparison with the music of our own times, of necessity indistinct in outline and pale in colour; and that the same thing was true, in some degree, of national melody, whether of ancient peoples, who had cultivated music scientifically, or of modern peoples, who had not. The idea of a scale or a key, is represented sufficiently for practical purposes by the word *tonality*. The music of the old masters differs from ours in many things, but more than all in tonality. But there is music differing from ours, not only in tonality but in system; the word "system" technically expresses the number and relation of the sounds between any given sound and its octave. In the modern European system the extreme number of these is thirteen, but other peoples have made a different division. In stating this, the lecturer did not take into account the savages concerning whose music some travellers have given us such exact information. When one of these tells us that the inhabitants of some island in the Indian Ocean habitually sing the third of a scale a quarter of a tone sharper than Europeans, we may reasonably demand evidence of his right to dogmatise on such a nice point. Musicians, highly gifted and highly practised, occasionally fail in their own intonation, and are mistaken concerning that of others. But, without reference to barbarians, it is certain that systems different from ours have been employed by nations sufficiently cultivated to expound them; their instruments would, in many cases, prove this. Mr. Hullah here compared (by the aid of diagrams) two or three oriental systems with our own. Melody, constructed on some of the former, certainly might give pleasure, after a time, even to us. But harmony, save within the narrowest limits, was, on any system but our own, inconceivable. Further demonstration (accompanied by illustration) of the nature of a scale, and its variety of modes, led to the conclusion that two conditions were essential to a melody, in order that its tonality might be unequivocal. (1.) That it include the fourth and seventh of a scale, and (2) that it end on the key-note, or on a note of the triad of the key-note; *i.e.*, if a melody were in the key of C, it must include B or F, or both, and end in C, E, or G. Even these two last endings were of doubtful legality. Perhaps tonality depends more on ending on the key-note than on anything else; for there are many tunes the tonality of which, but for so ending, would be uncertain. The well-known tune, "Ye banks and braes of bonnie Doon" (whether English or Scottish it is needless to inquire), is a case in point. The first section of another Scottish tune, "Cauld kail in Aberdeen," presents another example. The fine air, "Roy's wife of Aldavalloch," is not only wanting in a fourth and seventh, but ends on a note not decisive of its tonality. It may be the third of a modern scale, or the final of an ancient one. "Hey tuttie tattie" ends on the fifth of the original key; one very obvious mode of harmonization would make it end in the key of the dominant of the original. Another tune, "Shame fa' the gear," ends on the sixth of the key in which it begins—its relative minor; thus, as was common in old tonality, beginning in one mode and ending in another. An instance of the exact converse of this is found in the Irish melody, "Arrah, my dear Eveleen," which began in A minor and ended in its relative major. Another characteristic of Irish, Scottish, and Oriental melody is the frequent introduction of the minor or flattened 7th of the tonic; as of B flat, supposing the tonic to be C. Two instances were given of this, the Scotch tune, "Baloo, loo, Lammy," and the Irish, "The old Lang o lee." Mr. Hullah then called attention to a popular error, which had probably grown out of this omission of the 4th and 7th—that most national melodies are in a minor key. He had long believed that this was not the case, and had been gratified to find his opinion confirmed by Mr. Carl Engel, of whose "Introduction to the Study of National Music" he spoke in very high terms. Mr. Engel believed that the proportion of major to minor national tunes is at least as high as eight to one. The misconception arose from the frequent occurrence of the minor 3rd in what Mr. Engel called the "pentatonic" scale—that in which the 4th and 7th were wanting. To what causes could the anomalies that have been alluded to be ascribed? Mr. Hullah had expressed elsewhere considerable doubts as to the genuineness of many so-called ancient melodies — transmitted, as many of them had been, through long ages, from voice to voice, and from instrument to instrument, without the conservative influence of musical notation. He gave an instance, in which he was personally concerned, of very considerable alteration made in a song, sung from memory, during only a very few years. But, whether genuine or not, a vast body of melody exists which presents very peculiar, not to say anomalous, features. On the supposition that the melodies were originally vocal, many of these anomalies are unaccountable. There is nothing in the nature of the larynx which would suggest or necessitate imperfect scales; but with instruments the case is altogether different. Vocal music is always supposed to be anterior to instrumental. But is this supposition justifiable by reason or probability? History would seem to point to a different conclusion, seeing that the earliest mention of music is not in connexion with a singer, but with him who was "the father of all such as handled the harp and the organ." Few sounds in nature, perhaps none, are isochronous. No untaught bird maintains the same pitch in singing for more than an instant. Neither the wail of the wind nor the roar of the sea are isochronous. Who will undertake to express thunder in musical notation? But the simplest reed or cane is easily convertible into a musical instrument—if it be not one already, and almost any stretched string will give a musical sound. If instrumental be anterior to vocal music, many imperfect melodies may be of prodigious antiquity. But whichever of the two be the senior, both are pre-historic, —as are, possibly, the germs, at least, of many national melodies.

Fourteenth Ordinary Meeting.

Wednesday, March 13th, 1867; George Fergusson Wilson, Esq., F.R.S., Member of Council, in the chair.

The following candidates were proposed for election as members of the Society:—

De Vere, Albert, 86, St. James's-street, S.W.
Ellis, E. S., The Newarke, Leicester.
Elwes, V. Cary, Billing-hall, Northampton.
Kirkbank, John, 10, Gray's-inn-square, W.C.
Knowles, John, 42, Moorgate-street, E.C.
Pearse, Joseph Salter, 18, Barnsbury-street, N.
Potter, Edward, Marine-house, Tynemouth.
White, Henry Hopley, Q.C., the Firs, Rectory-grove, Clapham, S.

The following candidates were balloted for, and duly elected members of the Society :—

Alsop, John Alfred, 22, Brunswick-square, W.C.
De Salis, Colonel Rudolphe, C.B., 123, Pall-mall, S.W.
Freeland, Humphry William, Chichester.
James, W. H., 78, High-street, Camden-town, N.W.
Kime, William Thomas, Louth, Lincolnshire.
Leslie, Thomas Edward Cliffe, Union Club, S.W., and 22, Old-square, Lincoln's-inn, W.C.
Marsh, William Robert, The Rice Mills, Bromley, E.
Morgan, Fortescue J., Stamford.

The Paper read was—

THE TINNEVELLY PEARL FISHERY.

By Clements R. Markham, Esq.

In bringing before a meeting of the Society of Arts the subject of the pearl fishery on the southern coast of India, I desire in the first place to disclaim all pretence to scientific knowledge, and to make it clearly understood that any special knowledge I may possess is merely derived from a careful attention to the subject during the last few years, and from a personal inspection of the Tinnevelly fishery grounds in the early part of 1866.

From time immemorial the pearl fishery in the narrow sea which separates Ceylon from India, has been famous in all the marts of the Old World, and has rivalled the renowned fishery of Bahrein, in the Persian Gulf. Opinions have always varied respecting the value of the pearls from these fisheries. Tavernier, the travelling jeweller, whose account of Persia is so well known to readers of old voyages and travels, said, in 1651, that the pearls from the sea that washes the walls of Manaar, in Ceylon, are, for their roundness and water, the fairest that are found, but rarely weighing more than three or four carats. Master Ralph Fitch, a London merchant, who made a voyage to the Indies in 1583, asserts, on the other hand, that though the pearls of Cape Comorin are very plentiful, they have not the right orient lustre that those of Bahrein have. Whatever the truth may be, touching the pearls of these rival fisheries, there can be no doubt that a vast concourse of merchants has been attracted to the Gulf of Manaar from the most ancient times, which is sufficient evidence of the value of the pearls. In later times the banks off Rio de la Hacha, Margarita, Cubagua, and Panama, in South America, have yielded large harvests of pearls; but the banks in the Persian Gulf and the Gulf of Manaar have been and still are the main sources of supply in the Old World.

The Ceylon fisheries have retained their reputation; but it is to the banks on the opposite side of the gulf of Manaar, off the shores of the collectorate of Tinnevelly, that I desire now to draw attention.

In the golden age of the Tamil people of southern India, the Tinnevelly pearl fishery paid tribute to the Pandyan kings of Madura. Its head-quarters, we are told by Ptolemy, were then at Koru, the modern Coilpatam. Marco Polo, in the end of the 13th century, mentions the land of Maabar, where many beautiful and great pearls are found off the coast. The merchants and divers, he says, congregated at Betalar in April and May; and he relates how the divers performed incantations to preserve them from the attacks of great fish in the depths of the sea. The shark charmer is still paid by the Ceylon Government for his attendance at the fisheries. In those days the sovereign received a tenth, and the divers a twentieth of the proceeds of the fishery. The great abundance of pearls from the Tinnevelly fishery, and from that of the Ceylon coast, excited the wonder of all the bold wanderers from Europe who completed the perilous voyage to India in early times. Friar Jordanus, a quaint old missionary bishop, who was in India about 1330, says that 8,000 boats were then engaged in this fishery and in that of Ceylon, and that the quantity of pearls was astounding and almost incredible. Friar Odoric, who travelled at about the same time, says that in this land are found as great store of good pearls as in any part of the world. Old Ludovico di Varthema, the garrulous wanderer from Bologna, mentions having seen the pearls fished for in the sea near the city of Choyl, in 1500, or thereabouts; and his Portuguese contemporary, Duarte Barbosa, gives a more detailed account of the fishery. He says that "close to this island of Coulam, in the sea, there is a sand bank covered with 10 or 15 fathoms of water, in which a very great quantity of fine seed pearls are found, small and great, and a few pearls; and the Moors and Gentiles go there from a city which is called Sael, belonging to the King of Coulam, to fish for this seed pearl, twice a year by custom, and they find them in some small oysters, smoother than those of our parts."

The head-quarters of the fishery were then, and indeed from the days of Ptolemy to the 17th century continued to be, at Choyl, or Coyl, or Sael as Barbosa has it, literally "the temple." This place is, according to Dr. Vincent, the Kora of Ptolemy, the Kholki of the author of the Periplus, the Koil or Choyl of the travellers of the middle ages, and the Ramana Koil ("Temple of Rama") of the natives. This would place it on the sacred promontory of Ramnad, or the island of Rameswarum. But it is more probable that the true locality which was the head-quarters of the Indian pearl fishery from time immemorial, is to be found at or near the modern salt station of Coilnapatam, on the coast between Tuticorin and Trichendoor.

Tuticorin, the present head-quarters of the fishery, has supplanted the ancient Coil for the last two centuries; and since the middle of the seventeenth century the agents of the powers that have successively directed the fishery, whether Portuguese, Dutch, or English, have uniformly taken their station at this little port. It is about 90 miles N.E. of Cape Comorin, on the Tinnevelly coast. The Naiks of Madura, the Telugu sovereigns whose family had succeeded the ancient Pandyan dynasty, were at the height of their power in the middle of the seventeenth century, and were lords of the Tinnevelly coast. These Naiks were the builders of all the magnificent edifices which now beautify the city of Madura, and their dues from the fishery were probably used as offerings to Minakshi, the fish-eyed goddess of the vast Madura pagoda, who now possesses amongst her jewellery a numerous collection of pearl ornaments. The Naik sovereigns had the proceeds of one day during the fishery, and when the Portuguese were powerful along the coast the Jesuits enjoyed those of another, whilst the owners of boats were entitled to one haul every fishing day. In those times there were 400 or 500 vessels at the annual fishery, and at the subsequent fair held at Tuticorin there was an assembly of from 50,000 to 60,000 persons. Captain Hamilton, who was travelling in the East from 1688 to 1723, described Tuticorin, when the Dutch were masters of the port, as well as of Ceylon. He says that a Dutch colony at Tuticorin superintended a pearl fishery a little to the northward of that port, which yielded to the Dutch East India Company a yearly tribute of £20,000.

The Dutch appear to have fished too recklessly and too often. On the Ceylon side, off Arippo, they fished from 1667 to 1768, with short intervals, their last fishery having been in 1768, after which year the banks had a complete rest until the first English fishery in 1796. On

the Tinnevelly side the Dutch fisheries were also incessant, almost annual. After the English occupation of Tuticorin there was a fishery in 1822, which yielded a profit of £13,000 to the Indian revenue. Another in 1830 yielded £10,000. Between 1830 and 1856 there were 13 examinations of the banks, and on each occasion it was found that there was not a sufficient number of grown oysters to yield a profitable fishery, and none was attempted. Meanwhile the state of affairs on the Ceylon side was far more satisfactory. From 1796, the date of the first English fishery at Arippo, to 1809, the yield was £517,842; from 1828 to 1837 it was £227,131; and from 1855 to 1860, £117,153. In 1859-60, of the two principal Ceylon banks, the Modrigan yielded 12,000,000 and the Cheval-paar 60,000,000 shells.

The unsatisfactory condition of the Tinnevelly banks, from the year 1830 to 1856, has been attributed to various causes. Captain Robertson, the late master-attendant at Tuticorin, thought that the widening of the Paumben channel, which has caused a strong current to flow over the banks, prevented the molluscs from adhering to the rocks; and that the boats employed in fishing for large shells, called *chanks*, killed the pearl oysters by anchoring on the banks; while the native divers attributed the state of the banks to the pernicious influence of two other bivalves, called soorum and kullikoz.

In 1856, however, an examination made by Captain Robertson proved very satisfactory, and four banks off Tuticorin, called the Cruxian-paar, the Nagara-paar, the Oodoroovee-paar, and the Klatee-paar were found to be well covered with young oysters, which would be old enough to be fished in 1860-61. The Madras Government, therefore, determined that every precaution should be taken, in order that the banks might receive no damage in the interval. Vessels were provided to protect the banks from poachers, and the chank fishery was ordered to be put a stop to at the termination of the contract. Captain Robertson was, unfortunately, lost in an unseaworthy pattamar, which had been obtained from the Bombay Government in March, 1859. He was succeeded as master-attendant and superintendent of the Tinnevelly pearl banks by Captain Phipps, to whose zeal and intelligence the fishery owes its present hopeful condition, and under whose auspices the fishery of March, 1860, the first that had been attempted since 1830, was opened.

The fishery of 1860 commenced on March 7th, and the sale of the Government share of oysters was conducted by public auction, which began at 15 rupees, and gradually rose to 40 rupees per 1,000. As many as 15,874,500 shells were sold, realising upwards of £20,000 as the net result to Government, exclusive of all expenses and of the shares allowed to the divers. In 1861 the results of the fishery were equally satisfactory, but in 1862 the banks were found to be in a most unpromising state, and no fishery was attempted. Out of 72 banks that were examined, only fourteen had oysters on them, and 57 were blank. The subsequent examinations were still more unsatisfactory, until the beginning of the present year, when Captain Phipps reports having found an immense quantity of pearl oyster fry on four of the banks off Tuticorin, namely, the Cruxian-paar, the Nagara-paar, the Klatee-paar, and the Atawaee Arupagam-paar.

I will now proceed to give some account of the pearl oyster, and of the establishment forming the Tinnevelly Fishery.

It is, perhaps, unnecessary to observe that the pearl oyster is not in reality an oyster at all, being more allied to a mussel. It has, like the latter animal, a *byssus*, or cable, by which it secures itself to the rocks, one of the most important points in its organization. When the animal desires to attach itself to a rock, its foot is protruded, and, after seeking out a suitable spot with the tip for some minutes, is again retracted into the shell. A strong fibre, of the form of the groove in the foot, is left attached to the base of the foot at one end and to the rock at the other. The process is again and again repeated until a strong cable is formed; and the animal is able to throw out a fresh *byssus* whenever it is broken by removal or other accident. The formation of pearls is a point which has long puzzled scientific men, and the subject received very minute attention from Dr. Kelaart in the course of his investigations at Trincomalee. Pliny and Dioscorides believed that pearls were the productions of dew; but that observant old Elizabethan navigator, Sir Richard Hawkins, shrewdly remarked that "this must be some old philosopher's conceit, for it cannot be made probable how the dew should come into the oyster." Modern research has suggested various causes for the intrusion of the nucleus round which the pearl is formed. Dr. Kelaart has suggested that the ova which escape through the distended coat of an overgrown *ovarium* may become imbedded in the interstices of the mantle and form nuclei of pearls; or that the siliceous internal skeletons of the diatomaceæ which form the food of the pearl oysters may serve a similar purpose. But Mr. Gwyn Jeffreys, in his report to the Secretary of State for India, informs us that "pearls are produced in consequence of the irritating tenacity of minute parasitic crustacea that adhere closely to the outside of the mantle of the pearl oyster. In order to get rid of these troublesome intruders the pearl oyster smothers them with a coating of nacreous matter, of the same description as that which lines the inside of its shell; and the gradual superposition of layer upon layer in concentric order results in the formation of the much-prized ornament. Its shape depends upon that of the nucleus. The parasites are of different kinds, some being spherical, others oval, and occasionally lying so close together as to make the pearl double or irregular. That the nucleus of the pearl ever consists of a grain of sand, or of the food of the pearl oyster, seems to me physically improbable. Any loose adventitious matter, such as sand, would be immediately removed by the continued action of the mantle, which is thickly covered with *cilia*. The food cannot find its way to the outer coat of the mantle through the wall of the stomach, as Dr. Kelaart imagined; and even if it got there it would not remain. Pearls are invariably found between the mantle and the inside of the shell."

The pearl oyster banks, which are very numerous, lie off Tuticorin and Trichendoor, and are about six to eight miles from the shore, and from five-and-half to eight-and-half fathoms from the surface. Each bank has a name, by which it is known to the divers. They consist of masses of rocky ground, rising in patches from the sandy bottom, and are probably exposed to ocean currents, which, by washing sand into the interstices of the rocks, often destroy the young oysters over a considerable area. The dead fish soon contaminate their neighbours; and, in addition to this danger, the pearl oysters share the banks with other inhabitants, some of which are undoubtedly pernicious to their well-being. Amongst bivalves, the most common are a large *pinna* (called by the natives *arkoe*), a *modiola* (called by the natives *soorum*), which is a sort of mussel with a swelled face, and an *avicula* or swallow-tail (called *kullikoz*). The divers believe that the two latter are very injurious to the pearl oysters, but Mr. Gwyn Jeffreys does not think that this can be the case. "They may," he says, "by congregating in too large numbers, choke the pearl oysters, like weeds in a garden; but the food of all is the same, namely microscopic animalculæ, and there is plenty of it." The pearl oysters, however, have a really formidable enemy in the great chanks, a sort of whelks (*Turbinella rapa*), which are used as horns in the worship of idols, and cut into segments of circles as bracelets for women's wrists. The chanks, when they get a chance, drill small holes, by means of their proboscis or tongue, in the shell of the pearl oyster, and then feed upon the mollusc; but it is asserted at Tuticorin that, while the pearl oysters live on the rocks, the chanks are generally found on the sand. The chank

fishery at Tuticorin was, at the time of my visit, leased to a Mr. Barter, at the rate of £25 a canoe for the season, of which he employed nine. They started at early dawn from the chank godown, about half a mile north of the town, and sailed out in a line, for a distance of some three or four miles, returning at dusk. The trade in chanks is almost entirely with Calcutta, and their price, formerly twelve rupees, was then only six rupees per hundred. There are also large starfish on the banks, of a white colour, picked out and fringed with bright crimson. Mr. Gwyn Jeffreys recommends the destruction of chanks and starfish whenever they are found on the banks, just as vermin are destroyed in a game preserve.

The pearl fishery has been conducted, from time immemorial, by a caste called Parawas, who are met with along the Tinnevelly coast, from Cape Comorin to the Paumben channel. They were all converted and baptised wholesale by St. Francis Xavier, and are now Roman Catholics, the ancient church at Tuticorin being the freehold of the caste. The headman of the caste, an hereditary office, is called the Jadi Talaven; he has a good house, built in the Dutch times, with portraits of former Jadi Talavens; but the present man spent £1,000 on his daughter's marriage, and is now heavily in debt. The Parawas drink very hard, but there is no thieving or other crime among them, and they are capital boatmen as well as divers. The divers age very fast, and all look old and withered men, from exposure and drink. They cross themselves before plunging into the water; and I was told that the longest time that any of them has been known to keep under is one minute and eight seconds. They get a rupee a day in ordinary times.

When a fishery is announced to take place, one thousand pearl oysters are got up, opened, and put into a canoe, where the whole product of pearls is collected. This is considered as a sample of the fishery, and the pearls are submitted to the inspection of the most experienced pearl merchants, who class them on a fixed principle. The classification is as follows:—

1. *Anie*, pearls of perfect sphericity and lustre.
2. *Anathorie*, failing in one of the above two points.
3. *Masengoe*, failing slightly in both points.
4. *Kalippo*, failing still more.
5. *Korowel*, or double pearls.
6. *Peesal*, or misshapen pearls.
7. *Oodwoe*, beauty.
8. *Mandangoe*, bent or folded.
9. *Kural*, very small and misshapen.
10. *Thool*, seed pearls.

The number of each class found in the sample is then published, on the authority of the experts, and this establishes the price of the shells at the outset, but the price fluctuates afterwards, according to the frequency of the prizes that are subsequently drawn. Tavernier mentions the same practice in 1651. He says that "in the eastern seas, before they fish, they try whether it will turn to any account, by sending seven or eight boats to bring 1,000 oysters each, which they open, and if the oysters per thousand yield five *fanos*, or above, then they know the fishing will turn to account." In 1861, the price began at 70 to 80 rupees per 1,000 shells, and afterwards sank to 40, 20, and 17 rupees. The fishery was held on the beach, about two miles north of the town of Tuticorin, at a place called the "Silawatooree," a Tamil word, meaning a fish-market. The shells were sold on large chunamed platforms, called *kottoos*, and hundreds of huts, with a few bungalows, surrounded the market, and formed a busy and very exciting scene.

Since 1861 there has been no fishery, and the attention of Captain Phipps has been unremittingly turned to the improvement of this interesting source of revenue. He is allowed a small establishment to guard and examine the banks. Two small schooners, the *Emily* and the *Edith*, were sent to Tuticorin in 1860, but the latter is now stationed at Paumben. The *Emily* was built at Cochin, of teak, with copper fastenings, 54 feet long, and 35 tons burden. There is also a little teak-built cutter, of 19 tons, called the *Pearl*. In 1865, a steamer called the *Godavery*, built for the navigation of that river, was sent to Tuticorin. She is of iron, of 80 tons burden, with an engine of 25 horse-power, and draws 3 feet; but she is flat-bottomed, and quite unfitted for sea service. The establishment costs 300 rupees a month for the six months during which the season lasts, and the vessels are daily out on the banks; and for the rest of the year the skippers of the *Emily* and *Pearl* get 20 and 15 rupees a month respectively. This very trifling outlay has hitherto sufficed for the examination and guarding of the pearl banks.

A Government pearl fishery is a most legitimate source of revenue, and forms an exception to other monopolies. Pearls are simply articles of luxury, in the strictest meaning of the word. The seas in which they grow cannot well become private property, and, if a profit can be derived from their sale, it is certainly a source of revenue which can give just cause of complaint to no man, while it benefits the community at large. In India, too, the Government are possessed of advantages which enable them to get the work of superintendence and management done with far greater economy and efficiency than could be secured by any private individual or company. So high an authority as Mr. McCulloch has taken an opposite view, and says that the Government monopoly ought to be abolished, because the expense of guarding and managing the banks exceeds the sum for which the fishery is let, and because anyone who likes should be allowed to fish on paying a moderate license duty. The edition of the "Commercial Dictionary" from which I quote was published in 1860, and during the two following years the Tinnevelly Pearl Fishery yielded a large net revenue to the state. This is a sufficient answer to Mr. McCulloch's argument. It is true that there has been disappointment; but the way to secure regular annual returns is to adopt a carefully-considered system of conservancy, and not to throw the fishery open to the depredations of all comers.

The precarious and uncertain condition of the Tinnevelly Pearl Fishery may be attributed, as it seems to me, to the reckless and improvident fishing of former times, and to the absence of a scientifically organized system. It is a very old story. A valuable product is discovered to be a source of considerable wealth, and forthwith a system of reckless destruction for the sake of immediate gain is inaugurated. Then the supply begins to fail, a panic ensues, and, when science and forethought are called in, it is discovered that ordinary prudence and a judicious system of conservancy would have ensured a regular and unfailing yield from the first. Such has been the history of the chinchona bark in South America, of the teak timber in the Malabar forests, and such, I suspect, is the secret of the unsatisfactory condition of the Tinnevelly Pearl Fishery since the Dutch times.

Indeed the same general principles will probably be found to be applicable to forest conservancy, and to the management of a pearl fishery. As a nursery of young trees forms an essential feature of most forest systems, so, as it seemed to Captain Phipps, a nursery of young pearl oysters would serve to replenish the pearl banks; and this idea was confirmed by a study of the method adopted with regard to edible oysters on the English and French coasts. The chief external difference between the pearl and edible oysters, is that the former secures itself to rocks and stones by means of a *byssus*, while the latter merely lies flat on the ground on its convex side; but there does not seem to be any ground for doubting that the pearl oyster might also thrive on artificial banks. In the Colne oyster fishery, the *brood* (*i.e.*, oysters two years old) is dredged up out at sea, and placed on *layings* within the River Colne. These layings are generally dry at low water, and they are paved with stones, old shells, and any other hard substances, to the depth of a few inches, so as to form a bed for the oysters, which would

otherwise be choked in the soft mud. This material is called *culch*. The culch must be kept perfectly clean and clear of mud, and every mussel shell must be weeded out, because they have a tendency, from their shape, to cause accumulations of mud. The oysters remain on the layings for two years, when they are fit for eating; and during this time there are constant examinations, in order that all dead fish and mussels may be removed, and the culch kept clean. In places where the layings are never laid bare by the tide, this is done by means of a dredge. All live oysters and culch are carefully thrown back, while dead fish, mud, star fish, mussels, and whelks are removed.

It seemed to Captain Phipps (a view in which I entirely concurred) that some such system might advantageously be tried at the pearl fishery; especially as Dr. Kelaart had previously ascertained that the pearl oyster is more tenacious of life than any other bivalve with which he was acquainted, and that they can live in places so shallow as to be exposed, for two or three hours daily, to the sun, and other atmospheric influences.

The following measure has, therefore, been sanctioned, for the formation of a pearl oyster nursery:—

The harbour of Tuticorin is formed by the Devil's Point, to the southward, and a reef, with two small islands, called Punnayudde-teevo and Paundian-teevo, to the east. Lat. 8° 47′ 17″ N.; long. 71° 14′ 19″ E. To seaward, in strong breezes, the surf breaks along this reef, in 12 ft. of water, but between the islands and the mainland there is good shelter. Large vessels, coming for cotton, coffee, and senna, are obliged to anchor outside the Paundian-teevo, at the north end of which there is a lighthouse; but there is snug anchorage for small craft inside, and close to the town of Tuticorin. Between the Paundian-teevo and the mainland there is a bank, with a depth of from 3 to 7 feet, entirely free from surf, currents, and influxes of fresh water. Captain Phipps has selected this bank for the site of a pearl oyster nursery. A parallelogram has been enclosed with walls 450 ft. long, 8 ft. wide at the bottom, decreasing to 5½ ft., and 10½ ft. high. These walls are composed of blocks of coral, and strengthened by rows of palmyra piles. There is to be a small bungalow at the western corner. At the centre of the eastern wall an opening 8 ft. wide is left, to be closed by wooden gates. The intention is to have the floor lined with blocks of coral or of rock, as culch; and to stock the laying thus formed with pearl oysters about two years old. The nursery was commenced in November, 1864, and completed in the end of 1865. When the act of spawning takes place, the fry will be caught on culch, prepared for the purpose, and allowed to grow until the young oysters are large enough to be removed to the deep-sea banks. The same plan will be followed in each succeeding year. The removal is necessary, because it would be impossible to enclose an artificial space large enough to hold as many grown shells as are required for a remunerative fishery, and because it is believed that the quality of the pearl depends on the depth and clearness of the sea in which it is found. This, however, requires proof. A single pearl oyster, 5 or 6 years old, often contains no less than 12,000,000 eggs, and in the fishery of 1861 the total number of shells taken only amounted to 15,847,500, so that the number of young molluscs annually obtained from the nursery will, no doubt, be abundantly sufficient to stock one or more of the banks. In the fishery of 1861, the two best banks, namely, the Putta-marikan-paar, and the Nagara-paar, yielded 5,862,000 and 4,798,000 shells respectively, producing 128,666 and 52,771 rupees. It is during the period of early growth that the pearl oysters are most exposed to danger on their native banks; and, at all events, the nursery system will ensure to them a much briefer exposure to such dangers, while it will provide against such complete denudation of the banks as has been so frequent of late years.

Of course the nursery is an experiment, but it appears to be one which is well worth a trial. Two objections have been raised to its success by men who are personally acquainted with the locality. It has been urged—first, that the sun will kill the molluscs in only five feet of water; and, secondly, that instead of one opening there ought to be several, allowing a free flow of water. With regard to the first objection, Mr. Gwyn Jeffreys says that "the pearl oyster thrives best in clear water, the depth being immaterial." "I am not aware," he adds, "how far the influence of the sun's rays can penetrate the water in tropical seas; but I do not believe it would prejudicially affect molluscan life." To the second objection it may be replied that the ebb and flow of the tide through the single opening, which is about 15 inches, will cause a sufficient movement of water, and that if not, other openings can easily be made.

After the nursery was completed Captain Phipps was met by the very serious difficulty of a total absence of pearl oysters for stocking it. The Tuticorin and Trichendoor banks were found to be quite blank. On the 25th of November, 1865, I spent the day on board the *Emily* over the Cruxian-paar, which is about four miles outside the Paundian-teevo light-house, and used to be considered one of the best banks. Divers went down several times, and there was a dredge overboard, but not a single live pearl oyster was brought up. There were several dead ones, together with pinnas, aviculas, purple sea-urchins, starfish, chanks, and pectens. The same result attended the examination of all the other Tinnevelly banks, and an equally unpromising state of things existed on the Ceylon side during the season of 1865-66.

Under these circumstances I strongly recommended that a supply of pearl oysters for stocking the Tuticorin nursery should be obtained from the Persian Gulf. Both Professor Huxley and M. de Broca (who has conveyed live molluscs from the United States to France in large quantities) consider that it would be quite feasible to convey pearl oysters from Bahrein to Tuticorin; and Mr. Gwyn Jeffreys has recommended that a supply of brood pearl oysters be procured from the Persian Gulf, and says that they could easily be transported alive in wells, such as are constructed for bringing cod-fish and lobsters to Billingsgate.

Soon after I made this recommendation, Colonel Pelly, the political resident in the Persian Gulf, sent me his interesting report, dated December 15th, 1865, on the Bahrein pearl fishery, which enables me to give a few particulars respecting it; premising that it has been previously described by several old writers, and in 1853 by Colonel Wilson. Colonel Pelly's is, however, the most recent account.

He says that the pearl banks along the Arabian coast of the Persian Gulf are the property of the Arabs in common, but no foreigner is allowed to fish them. The richest are those of the island of Bahrein, which are found at all depths, from a little below high-water mark to eighteen fathoms. It is believed by the Arabs that the lustre of the pearl depends on the depth of the water, and the best oyster beds are said to be level, and formed of fine whitish sand overlaying the coral, in clear water. The fisheries have taken place annually from the most remote times, without any sign of diminution in the supply; and about 1,500 boats are employed in them, which belong to Bahrein alone. The profit is about £400,000 a year, and the bulk of the pearl harvest is sent to the Bombay market, the rest to Bagdad. Colonel Pelly concludes his report by suggesting that a few hundred pearl oysters from Bahrein might be sent to the Gulf of Manaar, as an experiment.

While my proposal, that the Tuticorin nursery should be stocked by pearl oysters from the Persian Gulf, was under consideration, it became known that Mr. Holdsworth, the naturalist employed by the Ceylon Government, had found 30,000 pearl oysters on a bank near Mundi-teevo, on the Ceylon coast, and permission was given to take up 10,000 for the Tuticorin nursery.

Afterwards some more were found near Paumben, and on the banks off the Madura coast; and last January Captain Phipps made the welcome discovery already mentioned, that four of the banks off Tuticorin were well stocked with young oysters. The sea-weed that was brought up was found to be covered with fry, and Mr. Gwyn Jeffreys, to whom I forwarded a small parcel of it for inspection, has pronounced it to be fry of the pearl oyster.

Thus, the difficulty of stocking the banks and the nursery is, for the present, at an end, but it will probably be five or six years before the oysters will be sufficiently matured to allow of a profitable fishery. Meanwhile, the experiment will proceed in the nursery, and six large aquaria, with the necessary apparatus, microscope, and instruments, have been sent to Tuticorin, to furnish Captain Phipps with the means of watching the habits of the pearl oyster. A suitable room is now in process of erection for their reception.

Such are the measures that have been adopted with reference to securing an unfailing stock of pearl oysters for the fishery. The next point of importance is to attend to those rules of conservancy which are, as it seems to me, applicable alike to forests which clothe the mountains and to pearl banks which line the bottom of the sea. In the cork woods of Catalonia, for instance, the cork is taken from the same tree every eighth year. The plantations are, therefore, divided into eight sections, and one of these forms the harvest for each successive year. The same system will yield a highly remunerative return to the Government and other owners of chinchona plantations in India. In like manner, if the pearl oyster reaches maturity in six years, the banks might be divided into six sections, one of which would form an annual source of supply for a profitable fishery, and the stock might be kept up, with the assistance of the nursery. It would appear, from recent experience, that there are about two fisheries, yielding a net profit to Government of £40,000 every ten years, equivalent to a return of £4,000 a year, but coming in at very uncertain intervals. There seems to be no reason why this state of things should not be so far improved, by a system of scientific and carefully matured conservancy, as that the pearl fishery should be made to yield a regular annual return of £10,000 a year, at least, to the Indian revenue, so long as a demand for pearls continues to exist.

A very essential part of the duties of the superintendent will be to watch the banks every year, and carefully to examine their condition as often as possible. Mr. Gwyn Jeffreys has recommended that the banks should be dredged frequently, for the purpose of destroying the chanks and other noxious shell-fish, with their spawn, as well as the star-fish, the pearl oysters being carefully replaced; that systematic dredging should be carried on in the deeper water, for purposes of exploration, and to discover new pearl banks; that a steamer should be used for dredging and guarding the banks; and that a supply of pearl oysters should be obtained from Bahrein.

The provision of a steamer is a recommendation of the greatest importance. As diving operations must necessarily be conducted during calm weather, sailing vessels are of very little use for examining the banks, and the river steamer *Godavery*, already mentioned, is equally unsuited for such service. She is flat-bottomed, burns a ton of coal per hour, goes about four knots an hour, rolls tremendously, and, when there is any sea on, is positively dangerous. One superintendent has already been lost by providing him with an unseaworthy craft, and such a calamity must not be allowed to recur. The proper kind of vessel for service on the pearl banks would be an iron screw steamer of 40 tons burden, sixty feet long, by 15 broad, drawing five feet, and fitted with a screw propeller and engine of 10-horse power. Such a vessel could be provided for the comparatively insignificant cost of £1,700; and it is to be hoped that, before long, the Government will decide upon furnishing the superintendent with this very essential means of performing his duties on the pearl banks.

It will have been seen, by a consideration of the points which I have endeavoured to explain, that the possibility of so far improving the Tinnevelly Pearl Fishery as to ensure an annual supply of oysters, yielding a net profit to the State, depends upon the success that may attend our measures, first, for furnishing adequate supplies for stocking the banks; secondly, for husbanding that stock; and, thirdly, for the conservancy of the banks.

The measure which I have advocated for securing supplies for stocking the banks is that originated by Captain Phipps, namely, the rearing of pearl oysters in an artificial nursery. It is true that the success of this experiment is considered doubtful by Mr. Gwyn Jeffreys, Professor Huxley, and other very high authorities, but, at the same time, there do not appear to be stronger reasons to expect disappointment than are attendant on every new experiment, and this one is certainly worth a trial. Under any circumstances, when the natural supply fails, the banks can be stocked from other localities. The husbanding of the stock will be attained by a careful attention to the rule that the pearl oysters are never to be fished until they have reached full maturity; and if they are of different ages on different banks, an annual fishery will be insured. Lastly, the measures of conservancy embrace a frequent examination of the banks, and the destruction or weeding out of everything that is detrimental to the growth and well-being of the pearl oysters.

In conclusion, I cannot refrain from an expression of my conviction that if success is possible, it will be attained by the present superintendent, Captain Phipps, whose zeal, energy, and fertility of resource have already been so beneficially exerted. The Tinnevelly Pearl Fishery could not, I am well assured, be in better hands.

It is with much diffidence that I have ventured to address this Society on so interesting and important a subject, because my want of accurate scientific knowledge renders it impossible that I should have done it justice. I trust, therefore, that it has been fully understood that I only profess to have given the results of a personal inspection of the fishery ground, and of some previous and subsequent study of the subject.

DISCUSSION.

The Chairman, in inviting discussion on the paper, mentioned that there was one enemy of the pearl oyster which Mr. Markham had not alluded to, and which he was informed was considered in Ceylon to be a very formidable one—that was a large fish of the skate species, which was supposed to eat the oysters, shell and all.

Mr. Wright inquired whether he had rightly understood Mr. Markham to say that, as far as Ceylon oysters were concerned, the pearls were found in the body of the oyster, and not in the shell.

Mr. Markham replied—Always between the mantle and the shell.

Mr. Wright remarked that in the shells from the Persian Gulf, and those from the Arru Islands, south of New Guinea, the pearls were found occasionally in the nacreous part of the oyster, or what was commercially known as mother-of-pearl. The natives, when the oysters were collected, generally drilled a hole in the mother-of-pearl or shell, or broke it up to get out any real pearls there might be in it, but occasionally they missed one, and he recollected, about ten years ago, a workman in Birmingham found, in one of the shells he was employed upon, a very large and perfectly-formed pearl, which he disposed of for £40, and it was afterwards resold for £200. Small pearls were frequently found in this way, some perfect, and others only of partial formation. In the instance he referred to, the pearl was perfect in form, and of the shape and size of a small damson.

Mr. Frank Buckland had listened with great interest to Mr. Markham's able paper on a subject on which, comparatively, little was known in this country. During the last seven years there had been a similar failure of the oyster crops in England to that which had been mentioned with regard to the pearl oyster banks; indeed, there had hardly been any crop at all in England. He thought they ought to consider very seriously the cause of this failure. The reasons given by Mr. Markham were, that the oysters were either destroyed by the chanks or the star-fish, but he (Mr. Buckland) was of opinion that the failure of the crop of pearl oysters, as also of the English oyster fisheries, was due to larger causes than those mentioned by Mr. Markham. They had been told that as many as 12 millions of eggs were found in a single pearl oyster. The English oyster had as many as 800,000 eggs. Yet where were all the young oysters? There must be some greater causes of destruction of the young brood than those mentioned in the paper. He believed it was because there had been no "fall of spat," and that remark applied, particularly during the last three or four years, to the whole of the oyster fisheries of the British Isles, extending to Ireland. He was delighted to hear that a project for the artificial cultivation of the pearl oyster had been taken up. The success of that undertaking would depend very much upon supplying to the young oysters the conditions which they required. The young oyster brood required, in the first place, to be kept in a state of tranquillity, and to be protected from currents of water, as a very slight current was sufficient to waft them to a distance from the parent bed. That, he thought, to some extent accounted for the new beds discovered by Captain Phipps. He (Mr. Buckland), therefore, highly approved of the proposed plan of impounding the young brood in the situations in which they were found. The heat of the sun, where the beds were in shallow water, would, he thought, occasion no difficulty; for, if the pearl oyster was anything like the English species, the young brood were best developed under a considerable amount of solar heat; it was only the older fish which required to be shifted into deeper water. The tanks on which the oysters for breeding were deposited should, in his opinion, be protected as much as possible from the action of the tide. If that were not done there was danger of the young spat being carried away. He entirely approved of the system of dredging referred to in the paper. He would ask what was the depth of water over the bank. [Mr. Markham replied about seven fathoms.] That, Mr. Buckland said, might be a practicable depth for efficient operations with the dredge. He also agreed with the system of "culling" the crop, and distributing the oysters, according to their growth. That was the plan adopted in England; and thus each year in turn produced its matured crop of oysters. The dredging would do no harm to the young pearl oysters, because they would soon form a new byssus. He did not very well see how dredging could be carried on by means of a steamer, especially one with a screw, as there would be a difficulty in using more than one dredge at a time, whereas four or more were sometimes put out together. As all the dredges would drift in the same direction, there was danger of the drag ropes getting foul of the screw. He very much preferred dredging with a sailing vessel. He quite agreed with the admirable remarks in the paper with respect to the reckless destruction of the oysters. It almost made him weep to hear of it. He called it murder to take little oysters not bigger than half-a-crown, which in a few years would have come to maturity, and have fetched a large price in the market. Reverting to the many destructive influences to which the young brood of pearl oysters were exposed, it occurred to him that a sandstorm might cover them over and destroy them; a sudden irruption of cold water from the bottom, or an influx of snow water from the land, might have the same effect; and, moreover, in tropical climates an oyster bank might be destroyed by submarine volcanic action. He did not think so much of the ravages of the skates mentioned by the chairman, as they must have a very voracious appetite to eat up a bank of oysters seven miles in extent. When one bank was exhausted, the managers should look out for another, and by means of the dredge follow up the young broods, who, in some degree, resembled swarms of bees, who did not usually travel very far before they alighted in search of fresh quarters. The dredging was also beneficial in preventing the oysters from being killed by the superposed weight of too large an accumulation at one spot, and in killing the star-fish, or "five fingers," the greatest vermin on an oyster farm.

Mr. Gwyn Jeffreys (responding to the invitation of the chairman) said, with reference to what Mr. Buckland had stated on the subject of dredging from steamers, he doubted whether that gentleman had had much experience in that operation; he (Mr. Jeffreys) had dredged for six weeks together with a steamer in the Shetland Isles, and constantly kept two dredges at work at a depth of from 80 to 100 fathoms. He found that method of dredging was by far the best for scientific exploration, and it would be equally so for such valuable products as pearls and oysters. In his opinion there was nothing like a steamer for dredging. They could regulate the speed as they pleased, and the results were far more satisfactory than with sailing vessels. The steamer he used had paddles, but it made very little difference whether a paddle or screw was used. The observations of the first speaker as to the formation of pearls in the nacreous or inner layer of the pearl oyster were quite correct; imperfect pearls were often found in that position. He did not think they would be of much commercial value, because they were not spherical, but contrivances were adopted for cutting off the irregularities, so as to improve the appearance of the pearl. The observation of the chairman, with respect to the destruction of the pearl oysters by a fish of the skate species, was important, and he was himself inclined to rank this fish with the tribe of star-fish and whelks and other natural enemies of the pearl oyster; but, by dredging and carefully watching the banks, he thought this skate might be destroyed, as well as, to a great extent, all the other vermin, so to speak, which had been mentioned. He had brought, for the inspection of the meeting, some specimens of young pearl oysters, some of which were brought over by Sir Emerson Tennant, and others were sent to Mr. Markham by Captain Phipps. He had also brought a section of a pearl, which he had prepared in order to ascertain what the real cause of the pearl formation was; and he found, by microscopic observation, there was an animal organism, and he should say—though it was difficult to make out these minute things, in consequence of some of the parts having been destroyed or lost—that the formation was of the nature described in his report, quoted by Mr. Markham, and which he thought would receive the general assent of zoologists. As a visitor this evening, he would express his thanks to Mr. Markham for the interesting account, historical, practical, and scientific, which he had given of this subject. He was quite satisfied, from what he knew of Mr. Markham, it was his modesty only which prompted his disclaimer of scientific knowledge, which he (Mr. Jeffreys) so well knew he possessed.

Mr. Tracy mentioned that, being engaged in the working of mother-of-pearl shells some years ago, he obtained two or three real pearls from a shell, in which they were imbedded just below the inner surface. These had been found in a China shell, which yielded mother-of-pearl of purer quality than the Bombay shells, the latter being generally dark about the edges. The pearls which he found in the way he mentioned were perfectly formed, about the size of tare seed, and of an oval shape.

Mr. Wright said, although he was not able to give any information on the subject of pearls proper, he would, with the permission of the meeting, offer one or

two remarks upon a product which was of greater commercial importance in this country, viz., the mother-of-pearl. The greatly increased use of that article in various branches of manufacture—more particularly of an ornamental character—had doubled the price of it during the last twelve months. The quantity of pearl shells imported into this country varied in value from £40,000 to £100,000 per annum. The most valuable shells for manufacturing purposes were found at the Arru Islands, which he had before referred to. According to the growth they varied in size, from as large as the palm of the hand to the crown of a hat. Last year there were fished 130 tons of shells from that locality. The value had now risen from about £7 per cwt. to £13 or £15 per cwt., in consequence of the great demand for mother-of-pearl articles in France and America, as well as in England. The fishery next in importance was that on the Sooloo Islands; the shells being distinguished by the yellow colour of the border and back, which rendered them unfit for ornamental manufactures, but they were principally used in Sheffield for knife handles and other purposes of cutlery. The shells which ranked next in commercial value were those known as the Bombay shells, which in reality came from the Persian Gulf fisheries; large quantities of them had lately been transported to this country by the overland route. The next important fishery was that in the Red Sea. The shells were sent to Alexandria; and since the railway had been opened from Trieste to Vienna nearly the whole of the produce of that fishery had gone to the latter city, affording employment to a large number of Viennese artizans, who manufactured for the American market, and had displaced the manufacturers of this country in that market to the extent of 50 per cent. Some years ago, between 4,000 and 5,000 persons in Birmingham found employment in the mother-of-pearl manufacture, but not half that number were now engaged in it. Since the great rise in the price of the shells had taken place, a very large proportion of the Red Sea produce was sent direct to London, and at the present moment there was probably a larger stock of Red Sea pearl shells in London and Liverpool than had been known for the last eight or ten years. The two other fisheries of note were that in the Gulf of Panama, called the Pearl Islands, and that in the Gulf of Mexico, from both of which large quantities of shells were annually obtained. It would seem that the temptation of the present high prices had led to these fisheries being worked to a greater extent than a due regard to future supplies warranted. The Americans had gone so far as to announce the formation of a mother-of-pearl fishery company, the operations of which were to be carried on by means of submerged vessels, but whether or not these would answer was still to be ascertained. Some years ago there was a pearl fishery in the Low Archipelago. The shells differed from all others in having a deep dark tone, iridescent, but not what was commercially known as black pearl, which was in fashion eight or ten years ago, but had now gone entirely out of demand. The price of these shells thirty years ago was only nominal, and large quantities of them were disposed of in Birmingham by burying them in the earth; but, upon the demand for them arising, many instances occurred in which they were dug up again and used. He hoped that these observations would be of some interest to the meeting, as the mother-of-pearl afforded employment to a large number of persons in this and other countries. He should be glad if Mr. Markham and other gentlemen would turn their attention to the obtaining of larger supplies for this country of the valuable shells from New Guinea and the Sooloo Archipelago. He stated, in conclusion, that the mother-of-pearl obtained from Ceylon was entirely useless for commercial purposes in this country.

Mr. J. H. Mackenzie would be glad to hear from Mr. Markham whether there was any good reason why the production of the pearl oyster should not be more developed on our own coasts. He had been informed by a friend that in some of the deeper lakes in Scotland a very profitable trade in pearl oysters had been carried on for several years. He believed that the cultivation of the pearl oyster could, with skill and care, be successfully carried on in our own latitude. The pearl itself was so beautiful a gem, that although the interests of a few dealers might be affected by a larger supply being obtained, it was desirable it should be placed, if possible, more within the reach of the community generally. He thought the development of the culture of the pearl oyster on our coasts was a subject worthy of the attention of this Society.

The Chairman, in closing the discussion, said he had seen a good deal at different times of the pearl mussel, from which the Scotch pearl was obtained. He had also seen instances of what were termed the false pearls in the shells of those mussels, but they were never of any great beauty. He had no doubt some gentlemen present had seen or heard of the pearls which were brought by Mr. Fortune, from China, where they got a large pearl mussel, and put into it several little bronze images of Bhudda, which became coated over with the pearly excretion, although they did not partake of the character of true pearls. Mr. Mackenzie had spoken of the Scotch pearls as an industry worthy of being cultivated, with a view to increasing the production of that gem in Great Britain. When fishing in the Highlands last year, he (Mr. Wilson) met with an individual who styled himself the Prince of Wales's pearl fisher, and who wore a silver badge in his bonnet, said to have been presented to him by the Prince. Whatever his claims might be to that distinction, he proved himself to be a well-informed and intelligent man, and on the subject of pearl fishery displayed an amount of knowledge which would have been interesting in the lecture-room. He (the Chairman) had brought with him a pair of Scotch pearl shells, which were given him by the person to whom he alluded, and which had, externally, every indication of containing valuable pearls; indeed, that pearl fisher informed him that he would have given £2 for the shells when first taken out of the water on the chance of the pearls they might contain. Some of the Scotch pearls he thought possessed greater beauty than many people supposed; and he would offer for the inspection of the meeting some fine specimens he had himself procured in that country. With regard to what had fallen from Mr. Mackenzie, he was bound to say his friend the Highland pearl fisher took an opposite view as to the probable remunerative character of the Scotch pearl fishery. He stated that he had exercised his vocation in his boat for many years, but, unfortunately for him, the people on the banks of the rivers, who constructed a cheap description of boat for themselves, over-dredged the rivers, and rendered his occupation a very unremunerative one. The chairman concluded by moving a vote of thanks to Mr. Markham for his very interesting and able paper.

The vote of thanks was passed, and briefly acknowledged by Mr. Markham.

Proceedings of Institutions.

Bank of England Library and Literary Association.—In the seventeenth annual report, just issued, the Committee, though rejoicing in its continued prosperity, regret that they cannot offer to the members such unmixed congratulations as they have been enabled to on former occasions, but have the painful duty of referring to the loss the Association has sustained in the death of its President, William Miller, Esq., who, though the term of his presidency was but short, yet gave great proofs of his interest in the association, and his desire to promote its welfare. The association has also lost another warm friend by the death of Mrs. Thwaytes, who

gave liberal donations to the funds. The number of members now on the roll, including 9 life members, is 507, being an increase of 12 over the number reported last year; and the library now contains 11,206 vols.; 356 of which have been added during the year. Several donations have been received, especially one of £25 from Mrs. Thwaytes, and a large number of books from various donors. The Committee, in compliance with the very generally expressed wishes of the members, have abolished library fines except those levied on engaged books. The financial statement shows that the receipts have been £305 12s. 3d., and that there is a balance in hand of £17 15s.

Westminster Working Men's Club.—The sixth annual meeting of this club took place on Thursday, the 13th December last. Sir R. W. Carden presided, and was supported by Judge Payne, the Revs. Canon Conway, J. Wright, and Samuel Minton; W. Delpratt, Esq., Mr. G. Blaby, &c., with the working men's committee, and the members of the singing class. There were also present Lady Filmer, Mrs. Cooper, Miss Adeline Cooper, and other friends. It appeared by the report that in December, 1860, the first club-room was opened in Duck-lane; it was enlarged by the addition of another room in December, 1861, was again enlarged and remodelled in November, 1863, and the premises being required for the Westminster Improvements, the club and its various societies were transferred to the present locality in April last, this being the sixth anniversary meeting. The Penny Bank is open three times a week, secretary, Mr. Thomas Griffith—deposits during the year, £89 2s. 4d.; withdrawn, £99 12s.; balance in hands of treasurer, £10 2s. The Labour Loan Society, enrolled according to Act of Parliament, meets every Wednesday evening; secretary, Mr. Andrew Glynn. There are 39 members; capital, £155 19s. 11¼.; amount of loans, £224; balance in hand, £20 11s. 9½d. The Temperance Committee meet every Monday evening; secretary, Mr. John Byland. The public temperance meetings are held on alternate Tuesdays; a sick fund is connected with the society, formed by a subscription of 1d. per week, which entitles a member of thirteen weeks' standing to 5s. a week for a month, in case of sickness. 368 pledges have been taken during the year; income of the society, £8 16s. 6d.; expenditure, £10 12s. 10d.; balance in hand, £5 16s. 1d. The barrow club is conducted on Monday evenings. A barrow, price 55s., is furnished to a member who pays 1s. a week for the hire of it, and at the end of fifty-five weeks it becomes his own property. Five barrows were supplied last year, and twenty-five barrows since the formation of the society. The co-operative society committee also meet on Monday evenings; secretary, Mr. James Peachey. The members first assembled to form the society on the 1st of December, 1865, when sixty-seven shares were taken up. The shop was opened on the 6th of July, and business was commenced with a capital of £30; the takings of the store during the first three months were £322; total income to the present time, £563; expenditure, £556; present capital, £40. Number of shareholders, thirty-two; number of paid up shares at 5s. each, 160; donations, £13 19s. 2d. The Bible-class continues to be conducted by W. Delpratt, Esq., but the educational classes could not be continued for want of some voluntary aid. Through the kindness of W. H. Allan, Esq., a chess club has been formed; it numbers thirty-two members, and is in a very efficient state. A donation of £2 had been received from the Earl of Shaftesbury, for books for the library, also gifts of books and three pictures from J. B. Harrison, Esq. Thirteen lectures, illustrated with diagrams, models, and experiments had been delivered and much appreciated, and three special meetings held. Admirable addresses were then delivered by the chairman, by the Rev. Canon Conway, the Rev. J. Wright, and Joseph Payne, Esq. A feature of the evening was the unveiling of a portrait of the Earl of Shaftesbury, painted expressly for the club, to which it is presented by J. B. Harrison, Esq., as a mark of his interest in the progress of the club, and a tribute of esteem for the noble Earl. A vote of thanks to the chairman was passed, and the meeting concluded with "God Save the Queen" and the Benediction.

PARIS UNIVERSAL EXHIBITION.

The Imperial commission has apparently decided on a complete change in the exterior decoration of the building. The colouring in panels in dark reds and bronzes seems to have been given up, and a uniform metallic painting adopted; it has rather too much the appearance of being black-leaded, but perhaps the effect is better than that of any of the previous attempts at decoration. The iron walls are being enlivened by the erection of large flag-staffs on the great pillars, the staff being several feet down on the face of the pillar, which is capped with a voluted ornament in zinc gilt; on the shaft of the staff is a decorated shield. The experiments with these staves afford another valuable lesson in decoration. The first staff put up was of plain wood, or painted the colour of yellow pine, varnished, and at the lower end was a gilt knob; this, being placed against the face of one of the square wrought pillars, had an admirable effect, while the floating pennant drew off the observer as it were from the iron ship-like sides of the building. The flag-staves have since been painted in bright colours, spirally, and instead of harmonising with or decorating the building, they stand out like barbers' poles, and challenge criticism. The word staff hardly represents the thing itself, which is more like a small mast; the knob is certainly nearly two feet in diameter, and the ornamental cap placed on the top of the pillar is at least four feet wide, but then, it must be remembered that the pillars are about a hundred feet high.

Great activity is displayed in the unloading of goods, and the great machine gallery no longer presents the empty appearance that it did a month ago. The three steam cranes are doing excellent service in this section, and it is to be regretted that permission was not given by the French authorities for the working of Messrs. Aveling and Porter's traction engine, which was brought over for the purpose of conveying the heavy machinery into the building. There are now in place Messrs. R. Stephenson and Co.'s inside-cylinder passenger engine, a small tank engine by Hughes and Co., a goods engine by Kitson and Co., of Leeds, and a passenger engine by the Lilleshall Company, of Shiffnal, Shropshire.

The heavy machine tools by De Bergue and Co.; Whitworth; Sharp, Stewart and Co., who, among other things, exhibit a lathe for turning railway wheels; Shepherd, Hill and Co.; and Worssam's wood-working machines are now in place.

Shand and Mason's steam fire engines, "La Seine," and "La Rhône," have also arrived.

Some fine specimens of iron are being unpacked in Class 40, sent in by the Earl of Dudley and the Bowling Iron Company.

The English agricultural implements are being placed in a well-lighted shed, situated near the railway station at the north-western corner of the park. Amongst the machinery that has been unpacked and in place, may be noticed a "Royal Patent Harvester," by Hornsby and Sons, Grantham; Fowler's steam plough; some ploughs by Ransomes and Sims, of Ipswich; and Richmond and Chandler's chaff-cutters. In the park the English are making great progress with their buildings. The trussed wooden girders to carry the roof of the boiler-house are now being raised into place, on the top of 56 ornamental terra-cotta columns. The boilers have been tested by the French engineers. They consist of three forty-horse Galloway boilers; a thirty-horse water-tube boiler, by Howard, of Bedford; a water-tube boiler by Hayward

and Tyler, of London; an arrangement for heating the feed water is also in place.

The English cottage is also well advanced, and promises to be an important addition to the park. Experiments in heating, lighting, and ventilation will constantly be carried on in it during the exhibition. Upwards of 140 manufacturers have contributed towards its construction with material and fittings. The roof is covered with a great variety of different kinds of slate and tiles.

The shed for the exhibition of the government war material is about 80 feet in length by 65 feet in breadth, and the guns, &c., are now being unloaded by some non-commissioned officers of the Royal Artillery, assisted by a working party of French artillerymen. A coil, weighing 18 tons 12 cwt. 3 qrs. has already been placed. A gun, weighing 24 tons, is also being unloaded.

Another shed, covering about the same area, for the exhibition of war material by private exhibitors, amongst whom Whitworth and Armstrong, and John Brown, who exhibit some heavy armour plates that have just arrived, occupy the principal space, is not quite finished, but judging from the activity displayed by every one connected with the exhibition, it will no doubt be ready to receive the guns, &c., in three or four days.

A timber lighthouse, upwards of 150 feet in height, is now well advanced, and will soon form a prominent feature in the ground, rivalling in height that constructed by the French lighthouse board, of wrought and plate iron. The French lighthouse is 177 feet in height, and weighs upwards of 380 tons; it was designed by M. Rigolet.

The barrack hut is now ready to receive the various fittings and furniture.

In the French department a great deal of machinery is being fixed. A 4-ton steam crane, by J. Chretien, of Paris, is working most satisfactorily. A cylinder, of great length of stroke, is placed in the jib of the crane, and the chain is connected directly with the piston-rod, and passes over pulleys, arranged in such a manner that the weight is lifted to a height of four times the stroke. Four locomotive engines are already in place, the first that arrived was one constructed by the well-known firm of Parent, Schaken, Cail and Co., of Fidas-Lille, for the heavy goods traffic on the Northern of France Railway, and as to quality of workmanship, it will bear comparison with any of our English makers. It is an eight-wheeled, coupled, outside-cylinder goods engine; and weighs, when in working order, upwards of 44 tons. The next are a ten-wheeled, coupled, outside-cylinder goods engine, for the Orleans Railway, weighing, when loaded, about 55 tons; a six-wheeled engine, by the same company, and a four-wheeled, coupled, outside cylinder engine, that has been constructed by the firm De Grafenstaden. The engines for the Mont Cenis Railway, constructing by M. Gonin, of Paris, together with the railway carriages, being made by Messrs. Chevalier, Cheilus and Co., of Paris, are also to be exhibited, but have not yet arrived. Several railway carriages and waggons, for the Eastern Railway, with a brake-van, fitted with Achard's electric brake, are also in place. The horizontal engines, by Duvergier, of Lyons; Boyer, of Lille, &c., are ready for working. Mazaline, of Havre, is fixing a good many machine tools.

The "Steyerdorf," the ten-wheeled articulated tank engine, designed by M. Haswell for the Austrian State Railway, that was exhibited in 1862 in London, has arrived, and will be exhibited here. M. Hartmann, of Chemnitz, is fixing several lathes, drilling, and slotting machines of excellent workmanship.

Cail, Halot, and Co., of Brussels, are exhibiting a good deal of machinery in the Belgian section, amongst which may be mentioned some sugar mill apparatus. Two cast-steel guns, from Krupps, of Essen, are being placed in the Prussian section of the great machinery gallery.

Some of the Saxon printing machines may be mentioned for their excellent workmanship and finish.

Three railway carriages, exhibited by the Berlin Joint Stock Company, are also in place.

The Imperial commission has decided on the exclusion of the public from the present moment, and has thus given satifaction to an almost universal demand. Now, that the time is so short, it is quite clear that no one but those engaged in, or otherwise connected with, the preparations should be admitted.

The yacht and pleasure boat department has grown to so much importance, that the nautical class has been sub-divided, and we have now Class 66 *bis*, or 66A, as we should say, *navigation de plaisance*. The sheds for the yachts, boats, and models, by the side of the Seine, are ready, and will soon contain an interesting collection. Twenty-seven officers and sailors, from Brest, will be attached to the station, the detachment to consist of a master gunner, a second sailing master, two quartermasters, four carpenters, and ten picked able seamen. An officer and six sailors will attend to the management of the salt-water aquarium, and two non-commissioned officers and a sailor to the exhibition of a life-boat. The Empress, Prince Napoleon, and Mustapha Pacha are contributors to the collection of yachts and pleasure boats.

The weather has undergone another change which is not favourable to the progress of works out of doors, but the various operations in the park are being pushed on with all possible dispatch.

The horticultural garden may almost be said to be complete, that is to say, nearly all the iron and other heavy work is done; the glazing of the conservatories will not occupy very long, and the filling of the houses with plants is only the work of a few days, as those that are to be shown are carefully kept elsewhere till wanted. The same may also be said of the shrubberies and flowerbeds, and M. Barillet Deschamps, the gardener of the city of Paris, and his five hundred men will soon make the parterres brilliant with flowers and foliage. They are now busy planting the shrubs.

The French fine art admission juries have done their work, and the result is the admission of 550 oil-paintings, 102 statues, 40 busts in marble, or terra-cotta, 83 frames of engraving, 23 of lithography, and 28 of architecture.

The jury for the admission of objects of art for the retrospective gallery is now appointed; it is divided into five sections. The first, which includes works of the ante-historic period, consists of M. Larbet, of the Saint Germain Museum Commission, president, and MM. Bertrand, Colomb, Desnoyers, Vachere de Reffye, the Marquis of Vibraye, and G. de Mortillet, secretary. The second section, that of sculpture, consists of M. Longperier, president, MM. Barbet de Jouy, Barthelemy, Chabouillet, E. Fould, B. de Monville, C. Oppermann, De Saulcy, and Henri de Longperier, secretary. The third section, painting, Baron Alphonse de Rothschild, president, MM. Ph. Burty, L. Delisle, A. Firmin Didot, E. Galichon, F. Reiset, Baron James Ed. Rothschild, and J. de Laborde, secretary. Section the fourth, goldsmiths and jewellers' work, arms, locks, metal utensils, &c., the Marquis Leon de Laborde, president, Count d'Armaillé, E. de Beaumont, Prince Czartoryski, E. Dutuit, Jules Labarte, Col. Pinguilly l'Haridon, Baron Jerome Pichon, Baron Gustave de Rothschild, Count de Saint Seine, and F. Seillière, secretary. The fifth section, furniture, glass, china, &c., consists of M. du Sommerard (of Cluny museum), president, G. Aigoin, A. de Basilewski, Ch. Davillier, Leopold Double, Dreyfus, E. Guichard, the Marquis of Hertford, L. Leroux, Maillet-Duboullay, Count de Nolivos, d'Yvon, and Albert Jacquemart, secretary. M. Alfred Darcel, of the museum of the Louvre, secretary of the special commission for this branch of the exhibition, acts as general secretary for the juries.

The accounts from foreign countries promise well for the prospects of the exhibition. The Commercial Council of Brussels has just voted a sum of 5,000 francs in aid of a fund for enabling Belgian workmen to visit the exhibition.

The *Gard* steamer has brought 60 cases containing a portion of the objects to be exhibited by the Pacha of Egypt; on its last voyage the *Gard* brought 43 immense cases of wood-work for the Egyptian buildings in the park.

The new Taïkoun of Japan has decided, it is said, to send his brother to represent him at the exhibition.

AGRA EXHIBITION.

The Exhibition of Works of Art and Industry made by a committee representing the North-West Provinces of India, has recently taken place at Agra with great success (a notice of the objects likely to be exhibited, was lately given in the *Journal*, see p. 181). It seems to have excited much interest among both the natives and the British. It remained open from Monday, the 4th February, to the Saturday following. Prizes were awarded by jurors, but the list was not dispatched by the last Indian mail. It was opened, in state, by the Lieutenant-Governor, Mr. Drummond.

The following was the speech of the President of the Central Committee, Mr. Thornhill:—

"Honorable Sir,—The Central Committee, to whom you entrusted the arrangements for carrying into effect your desire that a general exhibition of the Agricultural and Industrial products of the North-West Provinces should be held at this place, beg now to lay before you a brief report of their proceedings, by which they trust that your wishes will have been realized.

"2. Your Committee's first attention was directed to the adoption of measures for the adequate representation of the existing condition and resources of every district under your Honour's government, but they felt that the advantage afforded to producers, by the present opportunity, of comparing themselves with their fellow-countrymen in these provinces, would be greatly enhanced if the production of this part of the country could be shown in juxtaposition with those not only of other Provinces of Hindoostan and of the more distant Indian possessions of the British Government, but also with those of other Eastern countries, whose arts and munufactures have, until recently, been little known, and which will probably be seen for the first time by the majority of those who will visit this building.

"3. That your Committee have been able to bring together so varied, so interesting, and so valuable a collection of the products of the industry of China, of Japan, of Java, of Burmah, and of Singapore, and exhibit them with those of our Indian empire, is due entirely to the hearty and ready co-operation of all those whose aid they solicited.

"4. It is not less a duty than a gratification to acknowledge thus publicly their obligations, and the Committee desire to take this opportunity of bringing prominently to your Honour's notice the names of those to whom this Exhibition is more especially indebted for whatever measure of success it may be held to have achieved.

"5. For the spacious building in which we now are assembled, and in which so much that is rare and costly is displayed, we are indebted to the fertility of resource and ingenuity of one of our members, Mr. George Sibley, the chief engineer of the East Indian Railway, and to the courtesy and liberality of the Board of Agency of the Company, who placed the materials of which the structure is composed temporarily at our disposal.

"6. The exterior architectural embellishments, and the internal decorations, are the work of Lieutenant Cole, of the Royal Engineers, to whose artistic skill and cultivated taste the building is indebted for whatever ornamental character it possesses.

"7. It would be superfluous to praise that which must commend itself to all, but the Committee cannot refrain from congratulating themselves upon having been enabled to entrust this important department to an officer so eminently qualified to introduce into this country a decorative art, which as yet is so little known amongst us.

"8. Skilful ornamentation has not, however, been confined to the buildings alone—the garden, which is now blooming in what was a barren and apparently hopeless waste but a few weeks ago, and the ornamental band stand, attest the skill and energy of Colonel Rowlatt, to whom the sole credit of this metamorphosis, as well as of the orchestral arrangements, is due.

"9. To the Government of Bombay, the Committee are indebted for their large and valuable collection of the interesting objects exhibited from that Presidency, which was presented to this Exhibition at a cost of 10,000 rupees.

"10. This liberal gift was enhanced by the nomination of Dr. Birdwood to superintend the selection; and the care and judgment shown by that officer, not less than the great personal interest he has evinced, has rendered the Bombay contribution one of the most attractive in the building.

"11. The Committee are under a great obligation to the Honourable Mr. Justice Phear, who, during a visit to China, selected and brought to Calcutta the many specimens of the arts and manufactures of that country which are now exhibited.

"12. Mr. Temple, the Chief Commissioner of the Central Provinces, has not only forwarded a rich and most interesting collection of the products of his territory, but has also permitted his own series of water-colour drawings, illustrative of the physical aspect of the country, to be exhibited in the building appropriated to the Fine Arts.

"13. The Committee have also to acknowledge Mr. Temple's courtesy in deputing Lieutenant Trevor, the secretary of the recent Jubbulpore Exhibition, to convey his contributions to Agra.

"14. The Committee are under very great obligations to Mr. Dowleans.

"15. This gentleman has not only obtained for them many contributions from Ceylon, Japan, and Singapore, and rendered every assistance in receiving and transmitting consignments intended for the Exhibition, but he has also afforded the Committee the benefit of his large and varied experience.

"16. His suggestions and advice have, on many points, been invaluable, and the Committee have to regret that his important duties, in connexion with the Paris Exhibition, prevent Mr. Dowleans from being here to-day to witness the close of the labours which he has done so much to lighten.

"17. The Committee has also to tender their acknowledgment of the assistance they have received from

"The Hon. Colonel Macpherson, of Singapore.
"Mr. W. Morgan, to whom they are indebted for the Javanese collection.
"Captain J. O. Mayne, of the Royal Engineers, by whom the specimens were selected from.
"Captain Prothers, Secretary to the Government of the Straits' Settlement.
"Dr. Hunter, of Madras; Colonel Barrow, Lucknow; Major Paske, Goozerat; Major Lewin, Umritsur; Captains Beynon and Walter, of the Rajpootana Agency.

"18. The services of residents of these provinces and of the Local Committees will be duly acknowledged in the detailed report which the Central Committee will hereafter submit.

"19. The Committee would, however, except Rajah Sir Dinker Rao, whose liberal expenditure from his own resources, and great personal efforts to contribute to the class of the exhibitors, deserve special notice.

"20. But whatever assistance has been rendered in enabling the Committee to bring together such large contributions from every quarter, would have failed to enable them to carry out the chief end and aim of the Exhibition had it not been for the ceaseless labours of

the curators, by whom all the arrangements have been made for the suitable reception, classification, and exhibition of all the many objects which are here displayed.

"21. Without such arrangement and classification, the Exhibition might have afforded some amusement, but would have failed to accomplish its higher object of instruction and improvement.

"22. Those who see only the results which have been attained may find it difficult to realise the great, and latterly the almost incessant, exertions which were necessary to accomplish all that has been done.

"23. How great and incessant these labours have been, is best attested by the facts that, for the past few days, they have been continued night and day.

"24. The Central Committee desire therefore to bring the services of the Curators, Colonel Rowlatt, Dr. Playfair, Mr. James Simson, Dr. Moir, Lieutenant Cole, and Mr. Webb and Mr. Adam, most emphatically to your Honour's notice, and would direct special attention to the production of the printed catalogue almost simultaneous with the opening of the Exhibition, as a proof of the excellent system and organization which has characterised their proceedings.

"25. Lastly, the Committee commend to your Honour's notice the Secretaries, Messrs. Pollock and Plowden.

"26. Upon Mr. Pollock, as the Local Executive Officer, the main burden and responsibility of this undertaking has fallen; and the Committee feel that they do not exaggerate the value of his services when they attribute to him the chief merit of whatever success has been achieved.

"27. Mr. Pollock, however, on his own part, and on that of the Curators, desires to acknowledge the great indefatigable exertions of Mr. Robinson, who has been their Executive Officer from the commencement, and to whose energy and unremitting labour they attribute in a great measure the rapid progress which has been effected.

"28. I have now, on behalf of the Central Committee, to request that your Honour will announce that this Exhibition is opened to the public."

The Lieutenant-Governor replied in the following terms:—

"Mr. President and Gentlemen of the Committee.—It is with no ordinary feelings of pleasure and satisfaction that I receive the Address you have now presented to me.

"I heartily thank you, Sir, and all those associated with you, for the very able manner in which you have so far carried out the wishes of the Government.

"I shall avail myself of a future opportunity to express my sense of the obligation under which the gentlemen whose names you have just read have laid the government of these provinces. It will suffice to say now, that I cannot too highly commend the public-spirited exertions of those to whom we are indebted for a display of taste, energy, and skill, such as Northern India has rarely, if ever, seen equalled, even in the most brilliant periods of the past.

"Agra, indeed, in the present season, may be said to have resuscitated her ancient glories. The pomp and pageant of the Great Durbar are still fresh in the memory of many of us, but we have here a more interesting, if not so imposing a demonstration, for here, instead of the pomp of courts and the impressive display of military power, we have the most effective evidence of the benefits of civilisation, and of the triumphs of industry, of science, and of art, placed side by side with the raw material from which those wonders are produced, and to which courts owe their magnificence, and for which armies are maintained.

"And here I may say a few words as to what are the objects of these exhibitions:—

"They not are intended to be mere ephemeral shows, to amuse and gratify the eye. Broadly, I may say, they are meant to stir up the community, and to teach it that there may be something in heaven and earth beyond the narrow limits of their present philosophy.

"Their usefulness is freely admitted in England and in Europe; and Mr. Laing, when administering the finances of this country, laid much stress upon the importance of forming Agricultural Associations in this country also, as a valuable aid to social progress. Fully concurring in that opinion, it has ever been an object with me to promote them, though I wished, as far as possible, rather to foster independent action, irrespective of the government, persuaded as I am that it is only when taken up by the people themselves that such things can prove really and permanently useful.

"In the fulfilment of this wish, however, I have been disappointed, and eventually I determined upon the present exhibition as promising to afford a useful stimulus and guide to those local efforts, which have already been made in several directions, notably in Rohilcund, under the judicious guidance of my friend Mr. Inglis, with very fair measure of success, and to which we must chiefly look for practical improvement of the country. Another special object which I had more immediately in view in selecting Agra as the scene of this exhibition was that of interesting the chiefs of Central India, Rajpootana, and Bundelcund, in common with the chiefs and gentry of our own territories in the general progress of improvement and the development of the resources of their own states, and I am very grateful for the ready response which our invitations have received from many influential quarters.

"Last, but not least, among the objects of the exhibition is that of promoting cordiality of feeling and friendly association with one another of all the numerous classes—European and Native, whom I hoped to attract, and whom I am delighted to see so well represented around me this day.

"I trust these objects will be borne in mind by all whom I address to-day, and that they will endeavour, by courtesy and consideration, and free intercommunication, to assist and assure the success of this undertaking, upon which so much care and thought and labour have been expended, so that it may prove, however humble, yet no ineffective effort towards the improvement of the people and the promotion of good-will, and of the amenities of life among all classes. I now declare this Exhibition open."

THE BUDGET OF THE CITY OF PARIS.

The annual financial statement of the Prefect of the Seine is certainly a wonderful document. This year it occupies about thirty columns of the official *Moniteur*, and its totals exceed the revenues of many small states; but it must not be forgotten that the population of the department, which includes, besides Paris, the arrondissements of St. Denis and Sceaux, now exceeds two millions of souls; besides, the document deals with the accounts of three years, from 1865 to 1867, both inclusive, the first of which is not yet finally closed, and the last recently opened.

The following is the estimate for the year 1867, as given in the document in question, omitting centimes:—

Receipts.	Francs.
Ordinary	143,131,124
Extraordinary	12,394,488
Supplementary	25,000,000
Special	61,128,000
Total	241,653,612.

Expenses.	Francs.
Ordinary	96,325,791
Extraordinary	59,199,821
Supplementary	25,000,000
Special	61,128,000
Total	241,653,612.

Dividing this amount by the number of the population, 2,150,916, we obtain 112 fr. 30 c., or nearly £4 10s. per head.

The estimate for 1868 should also be published at this time, but the Prefect says that it has been delayed by circumstances, and adds:—"In your next session you will be called upon to decide on a financial situation of complete equilibrium, and you will no longer have to accept a budget, of which, in spite of all endeavours, a balance could only be established at the expense of the future."

The increase in the number of apartments is said to be in exact proportion with that of the population, the former amounting, during the last five years, to 55,127, and the latter to 132,139. Since 1852 the demolitions are given as 19,030, and the constructions as 80,055.

The following are principal items of expenditure as estimated for 1867:—

	Francs.
Annual charge on the municipal debt	18,658,696
Administration of the Prefecture of the Seine	63,709,481
Prefecture of Police	13,957,614

The above charge on the debt is upwards of two millions more than in 1866, and more than three millions in excess of that of 1865.

The sum set down for the administration of the Seine includes the following items:—

	Francs.
Public roads and paths	17,100,409
Of which the maintenance alone absorbs	8,352,500
Lighting	4,298,709
Cleansing	3,733,500
Waterworks and sewers	3,152,560
Promenades and plantations	3,247,995

The number of lights are to be increased by 1,000, making in all 31,400, of which 1,400 are oil lamps.

Amongst the items of extraordinary expenses for the coming year are:—

	Francs.
Public Charity	1,015,000
Architecture and Fine Arts	836,667
Bridges and Roads	5,165,000
Continuance of the improvement of the City	25,000,000
Improvement of Public Ways	12,000,000

The special expenditure amounts, in addition, to 61,028,000 francs, and includes, amongst other undertakings, the completion of about twenty-three miles of new roads, ordered in 1858, and of which nearly twenty miles are now open; the formation of conduits for the conveyance of 80,000 tons more water into the canal of the Ourcq, and to supply the deficiency of the canals of Saint Denis and Saint Martin in summer; the bringing of the waters of the valley of the Vaune to the new reservoir at Montsouris, eight mètres above the level of the sea, for the supply of the whole of the ancient portions of the city; the completion of two new artesian wells now under hand; the finishing of two large new churches, and the repairs of three others; the commencement of two more ecclesiastical edifices, and the alteration of several others in consequence of improvements made in their vicinity; the completion of one synagogue and the commencement of another; the finishing of the rebuilding of two mairies, the reconstruction of five others, and the enlargement of a sixth; the rebuilding of the Collège Rollin and the Collège Chaptal; the enlargement of the Ecole Turgot, and the construction of a new professional school; the finishing of ten or more other schools, which are either being rebuilt or enlarged, and of the great new barracks in the old city; the construction of a second and the enlargement of a third barrack; the erection of nine large buildings near the fortifications, for lodging the employés, in addition to five built during the previous year; the completion of the Halles Centrales, or grand central market of Paris, and its connection with the old rotunda, in which the corn market is held; the completion of three local markets and of the great cattle market, and of the new general abattoirs in connection with it at La Villette, and of the new abattoirs for pigs; the completion of the new *parc* of the Buttes Chaumont, and the commencement of two other public gardens, one on the plateau of Montsouris, and the other on the hill of Monmartre; the completion of the immense works of the Trocadero, opposite the Champ de Mars, and of the boulevards, avenues, and plantations forming part of the plan, and of those just commenced for the transformation of the gardens of the Luxembourg, and the avenue of the Observatory. A *resumé* of the public works executed in Paris during the past year was given in the *Journal* of the 21st December last; the above extracts will show the work cut out for execution during the present twelvemonth.

The year 1867 (says the report) was that one which gave rise to the most serious considerations, first, because it formed the central year of the period of five during which the great transformations now under hand were arranged to be effected; and, secondly, because the coming of the Universal Exhibition caused many works to be hurried forward which otherwise might have been left for the years 1868 and 1869, and entailed additional expenses. The Prefect, nevertheless, expresses his conviction that the financial resources of the city will be all-sufficient, and that in 1869 the entire plan will have been carried out, and that the municipality will then be relieved from the burden which now weighs upon it.

When this time arrives (says the report) it will be necessary to consider whether the transformation of Paris shall be proceeded with—whether the surplus means of the municipality shall be applied to the reduction of taxation, or whether it would not be the wiser course to divide the funds at the disposal of the council between the two objects. For the present, or rather for the coming two years, it is the advice of the Prefect that no new works shall be undertaken, and no diminution made in the taxation of the city, in order that the municipal council may be free to take the course which may seem best at the completion of the period in question.

By way of completing the review of the resources and expenditure of the city of Paris, it may be added that the *octroi*, or city dues, amounted last year to more than ninety-two million of francs (£3,687,000), and the population within the walls being rather less than two millions, the average contribution of the whole population was nearly two pounds per head, independently of other local taxes and of those of the State. Of the above sum, all but two millions of francs consisted of octroi duty proper, the remainder being made up of a composition paid by the gas company, charges on transit of goods, and sundry small items. The gas company pays two centimes per cubic mètre of gas consumed in the city, and the annual consumption exceeds a hundred millions of cubic mètres. Of the octroi dues, wine, spirits, and other liquids pay nearly two millions sterling; eatables, upwards of six hundred thousand pounds; fuel and oil, rather less than half a million; and building and other materials nearly a quarter of a million per annum. The growth of the octroi account is extraordinary; in 1855 it amounted to forty-two millions of francs only, so that it has more than doubled in ten years.

Fine Arts.

New National Gallery.—The judges are unanimously of opinion that not one of the ten designs can be recommended for adoption. At the same time they

think it is due to the competitors to point to the design for a new Gallery, by Mr. Edward Barry, and that for the adaptation of the old Gallery, by Mr. Murray, as exhibiting the greatest amount of architectural merit. The report then lays down general principles that should be observed in the construction of the National Gallery, which the judges believe compatible with the architectural effect required in a great national building. A correspondence has taken place in consequence of the non-adoption of any one design. The Rt. Hon. W. Cowper, late First Commissioner of Public Works, writes that this course is unfair towards the competitors, and will establish a precedent injurious to the success of future competitions for public buildings. The ten architects have also presented a memorial, in which they state that they agreed to enter the competition on the distinct understanding that one of the competing architects would be selected for employment, and they represent that a contrary course would be a breach of faith and a lasting injury upon every one of the competitors. It appears however that the present Ministry found no written or printed record of the assumed understanding, and Lord John Manners is prepared to abide by the literal letter of the original "Instructions." Furthermore, it would seem that a distinction may be drawn between "competing designs" and "competing architects;" and the terms of the instructions, it is thought, may yet be complied with by giving to some one of the "competing architects" the actual building of the Gallery. All the ten designs, on payment of the stipulated sum of £200 a piece, become the property of the State, and may be appropriated in the preparation of the amended design which shall be finally carried out.

National Gallery.—The annual report of Mr. Boxall, the director, contains interesting items. No less than ten pictures have been repaired, or cleaned and varnished, of which we gave early intimation. During the year 1866 five purchases were made, at the cost of £8,160; of these the most important was the Rembrandt, on which was expended £7,000. Mr. Boxall adds valuable historic notes in elucidation of these recently-acquired works. Among donations are "The Remorse of Judas," painted and presented by Mr. Armitage, A.R.A., and a marble bust of the late William Mulready, R.A., executed by a brother academician, Mr. Weeks. Both these works were exhibited in last academy. It is recorded that the bust of Mulready was "executed at the request of a number of his friends—artists and lovers of art—in admiration of his genius as a painter, and by them presented to the nation." The pictures by the old masters, in Trafalgar-square, have been visited by 775,901 persons, and the British school at South Kensington by 756,075. It is stated that "curtains have been placed before the Turner drawings now on the walls at South Kensington, to protect them from the action of light during the time they are not publicly exhibited." The average daily attendance of students for copying has been in Trafalgar-square, 23, at South Kensington, 25. In the former gallery were made 97 copies in oil, at the latter 121. It appears that Raphael's "Garvagh Madonna," which cost £9,000, has been in greatest request; the picture has been copied nine times. The most popular pictures at Kensington are Reynolds's "Heads of Angels" and "The Age of Innocence:" the one has been copied nine times, the other seven. Dyckman's "Blind Beggar" also still continues a prime favourite; it too has been copied seven times.

Manufactures.

Coal-cutting by Machinery.—It has been already announced in the *Journal* that the members of the South Lancashire and Cheshire Coal Association have determined on inviting competition for the best coal-cutting machine, and the committee of referees appointed by the Association have issued the following regulations for the guidance of competitors:—1. That compressed air is the proper motive power for working coal-cutting machinery. Machinery for compressing air is already erected at several collieries in the neighbourhood of Wigan, and will be placed at the service of competitors. 2. Inventors taking a prize must be bound by the condition that no annual payment, or tonnage royalty, as patent right, shall be charged to any present or future member of the above Association, but that such member shall pay a patent right on the purchase of each machine, to include the working thereof, which patent right shall in no case exceed 50 per cent. of the cost of the machine. 3. The committee reserve power not to award any premium unless they are satisfied with the performance and capabilities of the machine or machines submitted for trial. 4. Machines furnished for trial by November 1, 1867, will be tried by the committee, who will make their award thereupon in or before the month of May, 1868. 5. The committee direct the attention of competitors to the following requirements to which the machine must be adapted:—Thickness of seams from 2ft. to 9ft.; dip, or inclination, from horizontal to an angle of 20 degrees; as to weight of machine, lightness and easiness of movement desirable; maximum size of tub or waggon used in the mines, 3ft. 6in. by 3ft., and 3ft. in height; gauge of road, from 1ft. 6in. to 2ft. 3in.

Watchmaking at Besancon.—The *Annuaire du Doubs* gives the following account of the watch trade of Besançon. During the year 1865 there were submitted to the local stamp-office 296,012 watches, of which 95,594 were in gold cases, and the rest in silver; of the total number 3,192 only were marked for exportation. The trade of Besançon was founded in 1792, and it is practically the only watch-making district in France, for during the whole of the year 1865 there were only 31 gold, and 6,495 silver watches made elsewhere in France, and of these 23 gold, and 6,340 silver were made in Paris. The total number of watches submitted to the stamp-office in 1865, including foreign as well as French, was 378,498, and of this number Besançon supplied more than 78 per cent.

Commerce.

Fish and Oysters in France.—In the exposé of the situation of the Empire, appears the following account of the supply of fish and mollusks:—In 1865 the quantity of fish sold amounted to more than £1,640,000, and the fisheries employed 15,898 boats, and 57,961 men. Comparing that year with the preceding, we find an increase of £214,493 in the value of the fish, 470 boats, and 1,665 men. There were 1,340 beds, or parks of oysters formed in 1866, and 1,956 in 1865. At the present moment there exist 37,000 parks for the deposit or rearing of oysters, independent of 18,000 oyster beds, constructed on the banks of the Seudre, covering an extent of 15,000 acres.

Riga Flax in Algeria.—France imports, at present, a large quantity of flax seed from Riga; but the Governor-General of Algeria conceived the idea that it might be produced advantageously in that country, and commissioned M. Farnèse Favarcy, of Lille, to make trial of the matter. The first attempts, in 1865, were not successful. The wrong kind of seed seems to have been selected, and, moreover, the season was exceptionally bad. Last year the experiment was renewed in thirty different localities, in France, Belgium, Holland, and Germany, with seed grown in Algeria, and, without question, of the true Riga variety, with blue flowers, and the success is reported to have been complete. The plants have universally grown more rapidly than those produced from seed coming direct from Riga, and attained greater development, having a single stalk, good tap roots, and abundance of seed, large and shining.

The results obtained from seed sown in May, in places where late flax is cultivated, are said to have been equally satisfactory. In all instances the retting is said to have taken place in the best possible conditions by the various processes adopted in the north of France, that is to say by dew, stagnant water, running water, and the Bergnes method. The average yield of fibre was 25 per cent., which is the maximum of the best French flax; and the quality is reported to be superior to that obtained from Riga seed. The inference drawn is that Riga flax, which degenerates in France very rapidly, acquires unusual vigour in Algeria, and that when sown in the north of France as summer flax, it loses none of its primitive qualities, and that therefore the production of the seed in Algeria ought to be a profitable undertaking. But there is another and very important element to be taken into consideration, namely, price. The true Riga seed is at present cheaper than usual, but it costs, at Dunkirk, freight and insurance included, 45 to 50 francs the quintal; the Flemish seed generally fetches about 5 francs less than the Russian, and it appears that the Algerian seed may be produced at a price not exceeding that of the Flemish.

Colonies.

The Pastoral Interest in New South Wales.—A Sydney paper says that the hopes of the squatters are at their highest, and that they were never in a better position than they now are. Their flocks and herds are in first-rate condition—their runs are clad in verdure, bountifully supplied with water, and they are able to get high prices for their beeves and muttons. The shearing had been concluded, though the difficulty of obtaining shearers and washers had in some parts of the country retarded operations a great deal. The yield of wool this year is very large, and the average weight of fleece is good.

State of Queensland.—In the pastoral district the production of wool and the average increase in the quantity of stock exceed former years. The gold-fields are finding remunerative employment for a large number of men; copper-mining and the coal-fields are becoming more productive; and agriculture is extending, and the results obtained in the last year or two have established it in the public opinion as a profitable occupation. The imports of farm produce are being fast shut out of the market, with the exception of flour, for which the colony is still dependent upon other colonies. The growth of wheat is, however, rapidly extending. The experience of the past year has established cotton in the neighbourhood of Ipswich and in some other districts—another successful year will have the same effect all over this portion of the colony. A large amount of capital has been invested in sugar-growing, with every prospect of success, for that the cane thrives well has already been proved, and the machinery is in course of erection. The small quantities of sugar already manufactured show that experience only is required to ensure that end. On the other hand, however, in all the towns of this colony complaints are rife of the bad state of trade, and money is not to be had anywhere. The fact seems to be that the colonists have been over trading, the extent of the business operations having been out of all proportion to the population, and still more in excess of the income of the colony, annually produced from its own resources. It is unreasonable to expect that the large number of people who have landed there within the last three or four years should be able to settle down permanently in their places at once. Those who have been accustomed to the life of a farmer at home, and who, having brought with them some little means, have gone into the country and settled on their own land, are almost invariably doing well. But the majority of those arriving in the colony have preferred a town life, and the extensive building operations, and other improvements going on, have enabled them to find employment without going into the country. Immigration has ceased for a time, financial difficulties have stopped improvements to a great extent, and everything connected with the building trade is in a state of stagnation, numbers of tradesmen and labourers being thrown out of work.

Wheat from Victoria.—A Melbourne paper says that although experimental shipments of wheat have been made to London from the colony of South Australia, this is the first season in which the business has been entered into upon a large scale, either from this colony or from the one before mentioned. One ship in Hobson's Bay had 600 tons of wheat on board for Great Britain, and other considerable parcels have been bought for that market. As high as 5s. 6d. per bushel has been paid for wheat for export, and the success of these shipments will be watched with much interest. Heretofore, the neighbouring colony has found a ready market for its surplus produce in Victoria, but in future the latter is likely to grow enough for itself.

Obituary.

The Dean of Hereford.—The Very Rev. Richard Dawes, Dean of Hereford, died at the deanery, on Sunday, the 10th inst., after a long illness. The late Dean was born in the North Riding of Yorkshire, in 1797, and educated at the school of Mr. Rolfe, near Kendal. It was here that Mr. Dawes first met Whewell, who was three years his senior—a difference of age which permitted the former companions at school to stand in the relations of tutor and pupil at Trinity College, Cambridge. Mr. Dawes was fourth wrangler of his year (B.A., 1817; M.A., 1820), and was shortly afterwards elected fellow and mathematical tutor of Downing College. In 1838 he accepted the living of King's Somborne, in Hants, which he found one of the worst, and which his conscientious diligence made one of the best parishes in the county. When he went, there was no school there, no squire to help to found one, no farmer who was not opposed to the work of popular education; but Mr. Dawes' zeal and industry supplied every want, and in a few years the King's Somborne school was pointed to far and wide as a model, and eulogised by school inspectors. An account of this school was given by the Dean in a paper read before the Society of Arts, in April, 1853, entitled, "Remarks on the importance of giving a self-supporting character, as far as possible, to Schools for the Labouring Classes, and the means of doing so."* When he accepted the deanery of Hereford, in 1850, the bishop and clergy of the diocese united to present him with a testimonial; but what pleased him even more than this mark of kindness was that the very farmers, who, in the first instance, strenuously opposed him, came to thank him for the good he had done. His exertions in the same cause were not slackened by his new position. He acted for several years as the Society's Examiner in "Domestic Economy," and always evinced the greatest interest in its proceedings, especially those having reference to education.

Publications Issued.

Nature and Art. (*Day and Son*).—The first volume of this periodical, which comes out monthly, is just completed. The object and scope of the periodical are very wide; they may be said to be to draw attention to all

* See *Journal*, Vol. I., p. 265.

that is interesting in nature and art. The illustrations are numerous. Wood engraving, chromo-lithography, and photo-lithography are pressed into the service.

Notes.

The Manure of Cities.—The city of Bordeaux is in a difficulty about its refuse; contractors complain of the trouble they find in getting rid of some forty thousand tons a year. The authorities, after having received considerable sums of money for the manure of the town, are at present obliged to pay about £20 a day to get rid of the mere refuse and sweepings of the streets, not including road sweepings and sewage. It seems scarcely credible, but is positively asserted, that the refuse of Bordeaux is used by the cultivators of Isle and Dordogne, at a distance of fifty or sixty miles from Bordeaux, while in the neighbourhood of the last-named place not a ton is employed. The last contractor, thinking that the proprietors of the lands would be glad to take advantage of the facilities offered by the Bayonne Railway and the rival roads for procuring manure, hired the ground belonging to the station of the Southern Railway, and there collected a mountain of refuse; nobody would have it, and it is gradually rotting away where it stands. It would naturally be supposed that the manure was not worth having, but the contrary is proved by long experience; the very same refuse is advantageously used in the neighbourhood of Perigord, although the purchasers have to pay the expense of river conveyance, which occupies fifteen days, and some other expenses. Scientific and practical men are now making great efforts to waken the agriculturists of the neighbourhood of Bordeaux to the fact that they are allowing this source of prosperity to lie unheeded at their doors.

Correspondence.

The Water Supply of London.—Sir,—The paper upon this subject read by Mr. Beggs on the evening of the 20th Feb., shows that the views of that gentleman are perfectly correct, and is of the greater value on account of the discussion, carried on by eminent men, which followed the reading of the paper. That the supply of water to the inhabitants of the metropolis should be constant, with the mains always charged, is a question that admits of no doubt, and the various objections regarding waste and bursting are wholly untenable—that is to say, provided the supply taps be invariably fixed within the dwelling house, and not in the yard, unless under special circumstances and paid for accordingly, as the dripping or running of water taps in kitchen, chamber, or passage, would not be allowed one moment longer than necessary for the drawing of the water. In regard to the taps themselves, the high pressure stop-cocks, now in universal use, are tight and easy to turn, while the old conical plug tap is always either leaky, or too tight to turn with moderate force. The modern stop-cock can also be taken out and repaired without the assistance of the plumber. The fear of bursting has no foundation in fact, excepting in the case of severe frost, which must be provided against by never exposing either pipe or tap to the open air. It is also objected that much time will be lost when large quantities of water may be required quickly, but such is not the case, for, by turning the modern tap more or less, a tumbler or a bucketful may be drawn in the same time. In this town of Reading we have a constant supply, at high pressure, and I have frequently attached a hose and branch pipe to the tap we have in the garden, when the water has played over the roof of the house. I may also state that we have here two separate water-works, but both belong to one company. The old works supply unfiltered water for the streets and other purposes, while the new supply the town with filtered water, also at high pressure, and the payment or rating is per tap, with unlimited supply, but with the recommendation to allow of no unnecessary waste, except watering the garden in summer. The payment by meter, often out of order, is radically bad, because by that mode we endeavour to measure large volumes of water by means of infinitesimal measurements, always a source of considerable error. The rating must, therefore, be for each tap of a certain size; and where a dwelling is let to several distinct families, then each family must be provided with its own stop-cock, but not placed, as usually the case, over a sink or waste pipe, so that the users should be compelled to keep a pail to catch the drippings, or waste, which, under such circumstances, will be little or nothing to speak of. It is objected that the change from intermittent to a constant supply will cause great expenditure and inconvenience, but such will not be found to be the fact, for the expense will be the cost of a few yards of service pipe and a new tap, when in nine cases out of ten the sale of the cistern and complicated traps will more than compensate for the trifling outlay. Some difficulty might, perhaps, be anticipated in dealing with the dwellings in the poorer districts, where each house is let in many different tenements. But here again there is ample remedy at hand—viz., those persons who let such tenements must be made responsible for any breach of the laws of health, of cleanliness, and of morality, and should not be allowed to let their tenements to many distinct families without providing water supply for each floor or flat. If, as in many cases, the real landlord cannot be discovered, there is always a ground landlord, and he can be found, fined, and imprisoned for the misconduct that he has allowed to be carried on upon his property. I cannot agree with the storage plan, for the flood waters ought to be confined by permanent embankments, and forced to scour out the beds of our rivers, instead of devastating the country, and causing so much destruction of life and property. The flood waters, loaded with impurities, would have to be rendered clear by deposit and filtration, which latter process will never be carried out in a natural and philosophical manner, until filtration is made to take place upwards instead of downwards, the latter causing the water to be filtered constantly through its own filthy deposit. With regard to the question of supply, it is only by a perversion of nature, the ignorance and misdeeds of man, that towns are prevented from making use of the rivers that flow so abundantly at their feet. Again, I assert that if all dams, weirs, and other impediments were entirely cleared away, and our rivers permanently embanked; if all ordure, noxious impurities, and contaminations, were prevented from passing into the stream, there would be no difficulty in obtaining a supply of good water, to any required amount, within half a mile of any town, and at a very small comparative cost. Rivers form the natural drain of the country through which they flow, and it is flying in the face of an all-bountiful Providence to place any check or impediment in the free course of our rivers and their tributaries, from their spring head to their outlet into the sea. The two towns which I have found to be best supplied with soft pure water, and in which no machinery whatever is used, are Cape Town (Table Bay) and the city of Rome. In both the supply is constant and unlimited. The former is supplied by a spring at the foot of Table Mountain, in quantity sufficient to turn several mills. The city of Rome, although every house and garden has a well of good water, is furnished in addition with a superabundance of fine water by means of the aqueducts still remaining. All the fountains in Rome, both public and private, play night and day all the year round; and all water not used runs away into the Tiber. The Acqua Paulina enters Rome at such a

height as to drive several flour mills in succession before it reaches the fountains. The Acqua del Ape is in the Vatican, and forms a small fountain, which supplies the Pope's palace with the purest water imaginable, and is therefore called the "Fountain of the Bee." When Queen Christina, of Sweden, was shown the well-known great fountains in the Piazza di San Pietro, she said they were very grand, but she had seen them enough, and they might be stopped now. "Please your Majesty," was the reply, "they have played for more than a hundred years, night and day continually."—I am, &c., Henry W. Reveley.

Reading, 27th Feb.

Storm Signals.—Sir,—As your reporter appears to have misunderstood several of the observations I made on Wednesday evening, the 6th inst., I shall be obliged by your inserting the following corrections:—In the first place, the wave of barometric pressure which *seemed* to have travelled from Shanghai over Europe, to Montreal, in Canada, indicated a pressure at Shanghai of nearly 31 inches at Montreal, instead of 30 inches, as printed. In the next place, in illustration of great differences of pressure taking place within limited distances, I stated that on board a ship, in a cyclone, off the Malabar coast, the barometer stood at 28 inches (not 20 inches, which I suppose is a misprint), while a barometer at Ootacamund, within 100 miles, reduced to the level of the sea, stood at 30 inches, so that within 100 miles there was a difference of atmospheric pressure of two inches of mercury. In the next place, I did not say that a similar bulletin to Mons. Le Verrier's daily weather bulletin from Paris was issued in other capitals in Europe, but that storm signals, or warnings, had been practised by the celebrated Küpfer, of St. Petersburg, and by Mons. Bellot, of Utrecht, the latter of whom was so jealous of Admiral Fitzroy's reputation of being the first proposer of storm signals, that he has made a claim to having preceded Admiral Fitzroy in the matter. The next correction is, that I did not say that the Meteorological Committee of the Royal Society had already cost £10,200, but that the proposed cost was to be £10,200, with an outfit of £2,500. Finally, I did not say that a westerly wind came from a dry climate (a misprint, probably, for northerly and easterly), for westerly winds, particularly those with points of southing in them, bring aqueous vapour with them from the Atlantic, and the barometer falls as the dew point rises; but with winds from the north and east the barometer may be high in England with stormy winds, as I see was the case at Shanghai, in China, on the 15th January, 1867; with a strong north-east wind the barometer stood at 30·77 inches and the thermometer at 46 deg. N.B.—There is a misprint of 72 meteorological stations in Scotland for 55.—I am, &c., W. H. Sykes.

47, Albion-street, Hyde-park, 9th March, 1867.

MEETINGS FOR THE ENSUING WEEK.

Mon.....Society of Arts, 8. Cantor Lecture. Mr. John Hullah, "On Music and Musical Instruments."
London Inst., 7. Mr. G. A. Macfarren, "On the Lyrical Drama."
Society of Engineers, 7½. Mr. H. K. Bamber, "On Water and its effects on Steam Boilers."
R. United Service Inst., 8½. Major William Palliser, "The Conversion and Rifling of Cast Iron Ordnance."
Entomological, 7.
Victoria Inst., 8. Discussion on Mr. Warington's paper, "On the Credibility of Darwinism."

Tues ...Civil Engineers, 8. Discussion upon Captain Tyler's paper, "On Steep Gradients and Sharp Curves on Railways;" and (time permitting) Mr. W. A. Brooks, "Memoir on the River Tyne."
Statistical, 8. Mr. W. L. Sargant, "On the Progress of Elementary Education."
Pathological, 8.
Anthropological, 8.
Royal Inst., 3. Rev. G. Henslow, "On the Practical Study of Botany."

Wed ...Society of Arts, 8. Mr. Harry Lobb, "On Successful Oyster Culture."
Geological, 8. 1. Mr. W. S. Shea, "Report on recent Discoveries of Gold in New Brunswick." Communicated by the Right Hon. the Earl of Carnarvon. 2. Mr. W. Wheelwright, "On the Discovery of Coal on the Western Slope of the Andes." Communicated by Sir R. I. Murchison. 3. Rev. P. B. Brodie, "On the presence of Purbeck Beds at Brill, Buckinghamshire." 4. Mr. C. Moore, "On Abnormal Conditions of Secondary Deposits when connected with the Somersetshire and South Wales Coal Basins; and on the Age of the Sutton and Southerndown Series." 5. Mr. H. W. Bristow, "On the Lower Lias, or Lias Conglomerate of Glamorganshire."
London Inst., 6½.

Thur ...Royal, 8½.
Antiquaries, 8½.
Linnæan, 8. 1. M. Triana, "On *Melastomaceæ*." 2. Mr. McLachlan, "On New Genera and species of Neuropterous Insects (*Planipennia*).
Zoological, 4.
Chemical, 8.
Numismatic, 7.
R. Society Club, 6.
Royal Inst., 3. Prof. Frankland, "On Coal Gas."

Fri .....Royal Inst., 8. Dr. J. Bell Pettigrew, "On the Various Modes of Flight in relation to Aeronautics."

Sat .....R. Inst., 3. Prof. Frankland, "On Coal Gas."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 1st March, 1867.

28. Bills—Admiralty Jurisdiction.
43. ,, London Coal and Wine Duties Continuance.
44. ,, Lyon King of Arms (Scotland).
49. ,, Charitable Donations and Bequests (Ireland).
26. Revenue Departments—Accounts.
31. Army and Militia Services—Account.
71. Augmentation of Benefices—Return.
75. Societies—Return.

Delivered on 2nd March, 1867.

46. Bills—Petit Juries (Ireland).
54. ,, Hypothec Abolition (Scotland) (corrected copy).
57. ,, Railway Construction Facilities Act (1864) Amendment.
61. ,, Oyster and Mussel Fisheries.
46. Trade and Navigation—Accounts (31st December, 1866).
73. (I.) Railway and Canal Bills—Second Report.
85. Revenue and Population (Ireland)—Return.
87. Court of Chancery (Appeals)—Return.
Education—Minute.

Delivered on 4th March, 1867.

34. Bills—Sunday Trading.
64. ,, Religious, &c., Buildings (Sites).
32. Army—Statement of the Savings and Deficiencies.
53. National Debt (Savings Banks and Friendly Societies)—Account.
61. Bankruptcy Court—General Return.
81. Merchant Shipping—Account.
88. Lambeth Workhouse—Correspondence.
Metropolitan Workhouses—Report.
Miscellaneous Statistics (United Kingdom), Part VI.
Public Petitions—Fifth Report.

Session 1866.

422. (A VIII.) Poor Rates and Pauperism—Return (A).

Delivered on 5th March, 1867.

59. Bills—Dublin University Professorships (as amended).
60. ,, Municipal Corporations Charities.
83. Bunhill-fields Burial Ground—Letter.
89. Strand, Rotherhithe, and Paddington Unions—Correspondence.
90. Battersea Parish (Vestry Clerk)—Order.
100. Army—Supplementary Estimates.
Canada (Fenian Aggression)—Correspondence.

Delivered on 6th March, 1867.

46. Trade and Navigation Accounts (corrected pages).
79. Army (Sneider Breech-loading System)—Reports.
Public Petitions—Sixth Report.

Session 1866.

502. Start Point (Time Signals)—Return.

Delivered on 7th March, 1867.

48. Bills—Common Law Courts (Ireland).
60. ,, Municipal Corporations Charities (corrected copy).
62. ,, Factory Acts Extension.
63. ,, Hours of Labour Regulation.
78. (II.) Committee of Selection—Third Report.
84. Poor Law (Anglesey and Holyhead Unions)—Report.
94. Stud Shot—Report.

98. Passengers' Baggage (Paris Exhibition)—Memorials.
Manufactures, Commerce, &c.—Reports by Her Majesty's Secretaries of Embassy and Legation (No. 2, 1867).

Delivered on 8th March, 1867.

50. Bills—Sea Coast Fisheries (Ireland).
65. ,, Game Preservation (Scotland).
43. Civil Services—Estimates.
91. New National Gallery—Report.
99. Piers and Harbours (Provisional Orders)—Report.
River Plate (No. 1, 1867)—Correspondence.

Delivered on 9th March, 1867.

66. Bills—Metropolitan Poor (as amended).
69. ,, Chester Courts.
28. Woods, Forests, and Land Revenues—Abstract of Accounts.
86. Corn, Grain, and Meal—Statement.
93. Metropolitan Improvements—Statement.
101. London, Chatham, and Dover Railway Company—Account.
103. Bank Notes—Return.
Public Petitions—Seventh Report.

Session 1866.

509. Exports, &c.—Returns.

Delivered on 11th March, 1867.

13. County Rates—Returns.
75. (1.) Societies—Return.

Delivered on 12th March, 1867.

4. Bank Notes—Return.
92. Navy (Health)—Statistical Abstract.
102. Metropolis Turnpike Roads—Forty-first Report.
108. Lieutenant Brand—Correspondence.

Patents.

From Commissioners of Patents' Journal, March 8th.

Grants of Provisional Protection.

Armour plates—308—J. Benson.
Atmospheric plates of artificial teeth—286—N. T. Folsom.
Barrels, tilting—411—J. Walton and R. Harlow.
Bench and desk, combined—370—T. R. Jones.
Bobbins—336—W. E. Newton.
Boxes, fastening—282—F. Ashford.
Brace fabrics—280—S. H. Foster.
Breech-loading fire-arms and cartridges—483—M. Walker, G. H. Money, and F. Little.
Breech-loading needle fire-arms and cartridges—445—G. F. Redfern.
Buildings, floors for—459—R. Moreland, jun.
Cans, &c.—437—E. Stevens.
Charcoal box smoothing irons—348—E. Siddaway.
Chimney tops - 423—J. Capper.
Cinder shovels, &c.—419—R. George.
Coal, cutting, &c.—457—J. S. Walker.
Corsets—443—W. E. Newton.
Cruet frames, &c.—415—G. Ireland.
Designs in wool, producing—481—L. H. Mahon.
Drilling machines—338—A. B. Brown.
Electro-magnetic engraving machines—364—P. E. Gaiffe and A. A. Lalance.
Engines—296—E. S. Crease.
Engines—300—D. Greig, R. Burton, and F. Parker.
Fabrics—356—E. Firth.
Fastenings—256—S. Macarthur.
Fibrous materials, spinning, &c.—431—J. Shaw.
Fibrous substances, disintegrating—477—W. Riddell.
Fire-grates and furnaces—270—A. Craig.
Fires, lighting—258—J. F. D. Donnelly.
Food for infants—250—E. V. L. Ebersburg.
Furnaces—210—J. A. Jones and R. Howson.
Furnaces—268—J. Lockwood and H. Shaw.
Gas meters—449—H. Alder.
Gas pressure governors—495—W. E. Heath.
Glass-blowing—143—W. Bull.
Gun and pistol locks—332—T. Rigby.
Hoists, &c.—310—W., J., and T. Dewhirst.
Horse shoes—318—S. L. Lucena.
Horticultural buildings—294—W. Richardson.
Hurdles, &c.—475—J. Sainty.
Infants' feeding-bottles, &c.—207—J. Nodder.
Iron and steel, uniting—469—W. B. Adams.
Iron, &c., vitrifying—322—J. Ballouhey.
Kilns and ovens—290—J. G. Robinson.
Limestone and cement, calcining—471—H. Wadkin and C. Shepherd.
Liquids, filtering—330—G. A. Waller.
Lock spindles, adjustable—455—M. Cavanagh.
Locks—306—M. Cockerell.
Lubricating apparatus—467—W. S. Gamble.
Mathematical instruments—433—G. White.
Mechanical movements—352—W. Clark.
Metal, moving, &c.—342—G. Ramsbottom.
Mines, &c., lighting—252—H. R. Fanshawe.
Needles—302—C. P. S. Wardwell.
Oakum—451—E. Brasier.
Oils, preparing—344—G. E. Pain and C. Corroy.
Paper—254—B. Hunt.
Pearls or beads, artificial—331—C. E. Brooman.
Penholders, reservoir—288—J. Darling.
Pipes, junctions of—365—W. Jones.
Power loom lathes—487—W. W. Urquhart and J. Lindsay.
Power, transmitting—248—T. C. Entwistle.
Printing machines, cylinder—427—T. W. Nicholson.
Railroad switch indicators—453—A. V. Newton.
Railway crossings—272—T. Summerson.
Railway engines and carriages—493—M. Henry.
Railway trains, signalling between passengers, guards, and drivers of—304—W. J. Baker.
Reaping and mowing machines—371—J. Brigham and R. Bickerton.
Rifles—26—F. R. Aikman.
Ships' bottoms, coating—425—J. Lamble.
Ships' pumps—266—H. Roberts.
Silk, treating—264—C. E. Brooman.
Spindles, self-oiling—298—J. G. Tongue.
Spinning frames—320—T. Craven.
Spotted threads—489—C. E. Brooman.
Stands—194—F. H. McLauchlan.
Steam generators—292—A. V. Newton.
Street gutters, &c.—417—G. W. Wright.
Traps—204—F. Stephens.
Travelling—473—J. M. Kaufmann.
Umbrellas and parasols - 461—C. Weigand.
Venetian blinds—350—F. C. Leader.
Vessels, propelling—479—W. Hale.
Washing and churning machines—360—T. Sibley.
Water by atmospheric pressure, raising—274—T. and C. F. Cooke.
Water meters—429—A. V. Newton.
Weavers' harness—316—G. Haseltine.
Weaving, looms for—314—J. J. Harrison.
Window and shutter fastenings—328—D. Barr and J. Bloxham.
Wringing, &c., rollers for—421—W. J. Knowles and J. E. Wilding.
Yarn—262—G. A. J. Schott and J. S. Rosenthal.
Yarn, drying—324—J. G. Tongue.
Yarn, sizing, &c.—368—R. Haworth and J. W. Welch.
Yarns, &c., starching—340—F. Rosenauer.
Yarns, twisting frames for—366—T. Gill.

Inventions with Complete Specifications Filed.

Axles, self-lubricating—593—G. Haseltine.
Carding engines—542—T. B. Kay and F. Hamilton.
Heat, generating—560—S. B. Allen and J. H. Winsor.
Reflectors, adjustable—534—F. V. Wright.

Patents Sealed.

2326. E. Harlow.
2332. T. Baldwin.
2333. R. A. Hardcastle.
2340. W. E. Gedge.
2343. J. P. Bright.
2345. S. Woodall and J. M. V. Winkle.
2350. E. Phillips and J. Howie.
2356. J. H. Betteley.
2360. A. Cairns.
2363. C. F. Varley.
2370. R. Couchman.
2378. J. Twibill.
2380. P. Brash and W. Young.
2430. A. V. Newton.
2432. T. A. Rochussen.
2538. J. Daniel.
2617. J. Warwick.
2704. G. Davies.
2824. W. E. Newton.
3222. J. C. McDonald and J. Calverley.
3386. H. A. Dufrené.
88. R. Mushet.

From Commissioners of Patents' Journal, March 12th.

Patents Sealed.

2353. F. G. A. Horstmann.
2358. R. R. Riches & C. J. Watts.
2359. C. H. Cheshire.
2364. C. P. Stewart & H. Chapman.
2365. J. H. Johnson.
2367. J. Boyd, J. McPherson, T. K. Kerr and J. Taylor.
2368. J. Bindley.
2369. W. Tunstill.
2372. N. Dunn.
2374. B. Bayliss.
2375. C. C. Connor.
2376. W. Creasy.
2377. A. B. B. V. Rathen.
2379. J. Jackson.
2384. W. E. Gedge.
2390. G. Dyson.
2394. W. E. Gedge.
2398. H. W. Ley.
2417. H. Carter & G. H. Edwards
2442. F. R. Mosley.
2486. J. Y. Betts.
2518. J. Gueunier-Lauriac.
2519. P. P. J. Martin.
2535. M. P. Robertson.
2568. W. G. Valentin and G. H. Benson.
2612. G. H. Benson and W. G. Valentin.
2614. G. H. Benson and W. G. Valentin.
2616. G. H. Benson and W. G. Valentin.
2623. A. H. Brandon.
2895. P. Kirk.
3054. G. Haseltine.
3337. S. and J. J. Perry.

Patents on which the Stamp Duty of £50 has been Paid.

611. H. N. Penrice.
589. T. Greenwood & H. Hadley.
687. W. Clark.
571. W. E. Gedge.
576. E. Cowles.
587. C. Brakell.
738. W. Leuty.

Patent on which the Stamp Duty of £100 has been Paid.

605. J. Howard.
624. A. Paget.
617. R. Pitt.
650. J. H. Young.
640. C. Sheldon.

Journal of the Society of Arts.

FRIDAY, MARCH 22, 1867.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'Clock:—

March 27.—"On Flax, and Improved Machinery for its Preparation." By Chas. F. T. Young, Esq., C.E., Memb. Soc. Engineers, Assoc. Inst. N.A.

Cantor Lectures.

A Course of Lectures "On Music and Musical Instruments," by John Hullah, Esq., is now being delivered as follows:—

Lecture IV.—Monday, March 25.

Musical Notation.—Different Systems, Alphabetical and Special—Neumas—Accents—Lines and Spaces—The Time Table—Modern Notation; its Origin and Growth, Simplicity and Fitness.

Lecture V.—Monday, April 1.

Musical Instruments.—Classification—Wind Instruments—Stringed Instruments—The Plectrum, Hammer, and Bow—Instruments of the Ancients—Mediæval Instruments; their Introduction into the Church.

Lecture VI.—Monday, April 8.

Musical Instruments (*continued*).—Modern Instruments—Chamber and Orchestral—Combination—The Modern Orchestra—Conclusion.

The lectures commence each evening at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend to each lecture.

Examinations, 1867.

In addition to the prizes announced in the Programme of Examinations, the following are offered:—

The Worshipful Company of Coach and Coach Harness Makers offer a prize of £3 in Freehand Drawing, and a prize of £2 in Practical Mechanic, to the candidates who, being employed in the coachmaking trade, obtain the highest number of marks, with a certificate, in those subjects respectively.

The Worshipful Company of Goldsmiths offer three prizes—of £5, £3, and £2 respectively—to the three candidates who, being employed on works in the precious metals in any part of the United Kingdom, shall obtain from the examiners the first, second, and next highest number of marks, such prizes to be distinguished as the "Goldsmiths' Company's Prizes."

Subscriptions.

The Christmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Food Committee.

A meeting of the General Committee on the Food of the People was held on the 20th inst., at twelve o'clock. Present—The Right Hon. Henry Austin Bruce, M.P., in the chair; Mr. Harry Chester, Mr. C. Wren Hoskyns, Mr. Clare S. Read, M.P., Mr. McLagan, M.P., Mr. B. Shaw, Mr. F. Parish, Mr. Edward Wilson, Mr. James Ware, Mr. Sclater-Booth, M.P., and Mr. Ludford White.

The Chairman said, as business compelling him to leave London had prevented his attendance at some of the meetings of the Sub-Committees, he would ask Mr. Chester, who had been present at all of them, to report what had been done.

Mr. Harry Chester—The Sub-committee on Meat has met repeatedly. We have had before us various suggestions, descriptions, and samples of methods of preserving meat. We have given particular attention to those which profess to aim at the introduction of additional supplies of animal food from beyond sea. A sample of beef salted at Buenos Ayres, on Mr. Morgan's plan, by injection, was free from all objection on the score of putridity, but was very salt and rather tasteless. The meat at present to be obtained in South America appears to be very inferior to English meat. A perusal of Latham's "States of the Rio de La Plata," published by Longmans, will explain the causes of the inferiority of their meat. The governments of these states are anxious to extend the manufacture and sale of preserved meat; but their energies should, in the first instance, be applied to the improvement of their agriculture, to the renovation of their impoverished pastures, to the improvement of the breeds of cattle and sheep, to their better management, and to more skilful butchering. The meat must be improved before it can come into successful competition with the meat of the United Kingdom or of Australia. These remarks do not apply to the manufacture *Extractum carnis* (Liebig) in South America, for there is no reason to suppose that the *Extractum carnis* sent from there to this country is inferior in quality to that manufactured elsewhere. The Committee have had before them various samples of *Extractum carnis* manufactured in South America, in Australia, and in this country. They are all stated to be made from the formula given to the world by Baron Liebig, and the Committee have no reason to suppose that one is much better than another. The Committee have carefully considered the various opinions which have been given respecting this kind of food. It is dried beef-tea, and the present scientific view appears to be that it is not an article on which alone life could be sustained, but is valuable under certain limited conditions. In the first place, it is very portable; and, in the second place, it will keep good for an almost unlimited period, and in any temperature. For the limited purposes which it subserves a very small quantity goes a great way. It contains none of the fibrin or albumen of meat, but then those necessary substances are intentionally eliminated by Liebig, as not capable of being preserved for any length of time, and it is stated that they may be conveniently substituted by vegetable fibrin and albumen. The addition of eggs, or of some ripened grain seeds, to *Extractum carnis* is said to supply the deficient ingredients, and *Extractum*

has been recommended as a convenient and economical substitute for the beefy element in gravy soup and gravies, which are commonly made from stock meat. It should be borne in mind that of every hundred pounds' weight of beef about 75 pounds' weight is nothing but water, and when from the remainder the weight of the bone has been deducted, the residuum which is capable of being assimilated is very small, and that part of the residuum which is neither albumen nor fibrin, though important in its effects, may be concentrated in a small gallipot. At any rate, *pro tanto*, the increasing sale of *Extractum carnis*, which may be obtained at almost any chemist's or Italian warehouseman's, as it comes from distant countries, is an addition to our supplies of meat. I may add that another preparation, Dr. Hassall's Flour of Meat, which appears also to have a considerable sale, is stated by that gentleman to contain albumen, fibrin, gelatine, and fat, which are wanting in the *Extractum carnis*. The Committee has every reason to believe that this also is a preparation of considerable value. Returning for a moment to Mr. Morgan's process of salting meat, I may say that the Committee has obtained from the Admiralty a return, giving the opinions expressed by the officers and crews of various vessels in the Royal Navy, who had tried the article. The letter from the Admiralty remarked that the unfavourable opinions preponderated; but weighing the opinions as well as counting them, and bearing in mind the prejudice likely to be entertained against a new article of diet, the Committee were by no means led to conclude that Mr. Morgan's process had been shown to be a failure. The Committee had before them a specimen of beef preserved in paraffine by Professor Redwood's process; but as this had had but scant justice done to it by the cook, they could not pronounce an opinion upon it. Messrs. McCall, of Houndsditch, exhibited a specimen of South American beef, which was preserved in November, 1865, by the process patented by Messrs. McCall and Sloper. This sample was quite free from putridity; but the Committee require further information before they can pronounce on its merits. They have also had before them several samples of preserved beef imported from Australia by Messrs. McCall. This is "Tindal's Australian boiled beef." Messrs. McCall have received the first consignment of 60,000 lbs. weight; and arrangements are made for similar arrivals monthly. It appears to be prime beef, not salted, free from bone, and cooked ready for table, and is sold at 7d. per pound, in six-pound tins. This is about equal in price to uncooked meat, with bone, at 5d. or $5\frac{1}{4}$d. per pound. It is therefore cheap as well as good; and, as the supply can be enlarged to almost any extent, it is an important addition to our markets, and may even affect their prices. The process by which the meat is preserved is an old one—hermetically sealing in tins. The Committee are not at present in a position to report fully respecting an invention which promises valuable results in the hands of Professor Gamgee. The Committee, and several scientific gentlemen, who attended by his invitation, were present on two occasions when bullocks and sheep were killed by a painless process, and their flesh was subjected to a preserving process invented by the Professor. Specimens of the meat thus treated have been sent to the tropical departments at Kew and the Crystal Palace; and it is proposed to send other specimens to Australia, and to South America, to ascertain whether it will stand the test of the outward and homeward voyages, with their extremes of temperature.

The Sub-Committee on milk has also had repeated meetings. On this head the most important questions affecting the supply of milk for the metropolis, and other large towns, appeared to be mainly questions of transit by railway. The Committee has obtained returns giving various particulars from the milk-carrying railway companies; but as those returns are at present incomplete, I cannot now state their effect. Mr. C. Alexander Wood, a director and vice-chairman of the Great Western Railway Company, has kindly attended the Sub-Committee, and had brought with him Mr. Nicholson, the company's superintendent of parcels at Paddington; and the information given by those gentlemen will shortly be published.

Lord de L'Isle, a member of the Committee, has procured for its information an account of the system of cotters' cowkeeping which prevails in the North of England, and is there valued as affording not merely pecuniary means of support to the cotter, but opportunities for the purchase of small quantities of milk by the poor, and also a useful training in cleanly, industrial habits for the wives and daughters of the cotter, who are thus enabled to learn to make butter and manage a dairy, accomplishments which are rarely found in the women of the south. This it is also intended to publish.

Baroness Leisner-Ebersberg, who stated that she had patented in this country, under authority from Baron Liebig, his invention of Food for Infants, which she called Liebig's "Concentrated Milk for Infants," forwarded to the sub-committee a sample, manufactured by Mr. Mullen, of Titchbourne-street, which was tasted by the committee and found palatable. It was stated in her communication that Baron Liebig declared this preparation to be the chemical equivalent of mother's milk, and therefore the best possible food for such infants as are necessarily brought up by hand. The term, "Concentrated milk," appears to be a misnomer. It is in fact cow's milk, to which a small quantity of potash and finely-ground malt has been added. The Baroness said that she was forming a charitable society for the gratuitous distribution of this milk to the poor. The Committee have had before them a French lactometer which is used by the police in Paris to test the purity of the milk sold there. It clearly shows whether the milk is diluted with water, and to what extent. A similar lactometer, or milk test, purchased for one shilling in London, was also tried and found to act with correctness.

The Secretary then read a letter, addressed to Mr. Harry Chester, by Professor John Gamgee, on the subject of the preventible diseases among the herds and flocks of this country. It was resolved that the letter be published in the Society's *Journal*, and that a copy of it be sent to the Home Office and to the Board of Trade, with the expression of the Committee's hope that the subject, which was of very great national importance, might receive attention from Her Majesty's Government.

A Sub-Committee, on "Cooking and Cooking Apparatus," was appointed. The Committee then adjourned.

Cantor Lectures.

"On Music and Musical Instruments." By John Hullah, Esq.

Lecture III.—Monday, March 18.

Musical Expression.

In commencing his third lecture, Mr. Hullah said it was especially necessary, in the present instance, to define exactly the thing he was about to discuss, because the word "expression," in connection with music especially, was often used to represent that of which it was the mere vehicle, sentiment. As applied to musical performance, there might be some excuse for this confusion of terms, but as applied to musical composition there was none. Musical composition is expression; and it is the composer who expresses, while the performer simply presents the composer's expression. But before admitting the identity of musical expression with musical composition, we must be quite sure to what musical process the term composition can be applied. The conditions under which it is practised are peculiar.

Unlike any other artist, the musician requires long and special training before he learns how to realise the effect, in performance, of what he puts on paper. The musician must, so to speak, be able to hear with his eyes. An anecdote was given, related of himself by Rousseau, who, altogether ignorant of the effect of musical successions and combinations, had put on paper a Symphony the performance of which had been attended with the most disastrous results. Ignorance so absolute as Rousseau's was rare among would-be composers in modern times; but not so in ancient, even among trained musicians, and for a very simple reason; that composers, even down to the middle of the 16th century, had not ready access to those keyed instruments which present such a ready mode of testing musical effects. History shows that music has taken longer to attain excellence than any other of the fine arts. To a great extent this is attributable to the latter being revived arts; whereas music, in our acceptation of the term, is a new art. But its comparatively slow progress is due also to the difficulty which the earliest harmonists had in appreciating the effect of what they wrote. A fourteeth-century M.S., recently discovered at Montpellier, has been found to contain no less than three hundred and forty pieces of vocal music, in two, three, and four parts, by composers of the twelfth and thirteenth centuries. The melodies of many of these are very pleasing, but the harmonies are insupportable to a modern ear. In proof of this, Mr. Hullah played one of them, first without accompaniment and then with its contemporary harmony. Why was the harmony so inferior to the melody, both being of the same age and country?—Simply because the effect of melody could be ascertained in the very act of making it, while that of harmony, in these early times, had to be guessed at, or ascertained by processes too troublesome to be often brought into requisition. Moreover, musicians who wrote even as late as the end of the sixteenth century had other difficulties to contend with. Their *tonality* was different from ours and essentially empirical. Not that the old masters were altogether ignorant of modern tonality, but that they were very timid and slow in adopting it. The many changes in musical practice which were finally universally accepted only towards the end of the seventeenth century, turn, for the most part, on a more philosophical tonality. Everything that essentially distinguishes modern music from ancient is due to this. To the general acceptance of modern tonality we owe the distinguishing characteristics of modern music—*expression*,—that quality, in any given musical passage which, by whatever means, is able to put those who listen to it in a condition of mind accordant with, and like that of its author, at the moment of its conception. Till recent times, few essays in musical expression had been made save in vocal music, and these were much aided, as they had been dictated, by the words with which they were connected. Expression, by means of music pure and simple, is altogether a new art. The attention bestowed on musical expression during the 17th century is mainly due to the efforts of a body of amateurs living in Florence, who thought to remedy the shortcoming of the music of their own time by a revival of that of the Greeks. They neither succeeded in abolishing polyphonic music nor in recovering the music of the ancients, but they compelled musical composers to give more attention, as well to the general sentiment of the words they set, as to their particular emphasis and quality. Indeed, for a considerable time music was rather open to the reproach of *over*-expression than the reverse, and a style of composition became general in which notes waited on words with a pertinacity always servile and often ridiculous. The lecturer here gave a number of instances of this from composers of the 17th and 18th centuries. This kind of musical punning was advocated by many of the theorists of the time, among others by Christopher Sympson, in his "Compendium or Introduction to Practical Music." Contemporary composers certainly acted in the spirit of Sympson's instructions. Purcell has gone the length of imitating a drunkard, in musical notes, even to his stagger and hiccough; and his predecessor, Matthew Lock, has set the responses to the Commandments in ten different ways, each setting being, as he considered, characteristic of the Commandment which it followed. But mistakes in musical expression, or rather misapprehensions of the powers and uses of music, have been made by greater and more recent masters; for it is surely a mistake, and a misapprehension of the powers and uses of music, to deal with it as an imitative art. In the hands of a great master music is a suggestive art. When a musical passage is fairly performed, the sentiment of the composer will be communicated to the auditor, provided that it *be* a sentiment, not a circumstance, a material object, or a mere conceit. Their several musical expressions can be found for passions and feelings, but not for events, accidents, natural phenomena, &c., the representation of which in music generally proved impossible, and where not impossible, ludicrous. Mr. Hullah illustrated this by extracts from a work, Haydn's "Creation," on which, as a whole, he passed a warm eulogium, and related an anecdote of the great composer's failure in representing a storm at sea by pure musical sounds. After an account of some attempts at musical imitation, dating as far back as the beginning of the sixteenth century, the majority of which were purely vocal, the lecturer spoke of the purely instrumental attempts which had distinguished the end of the last and the beginning of the present centuries, when it reached its apogee of absurdity. He described a number of pianoforte pieces, commemorative and descriptive of the great events, especially the battles of land and sea, of that epoch. Most of these were *opera obscurorum virorum;* but some few were by musicians of considerable eminence,—among them, Steibelt and Dussek. A piece by the latter bore the title of "The Sufferings of the Queen of France: a musical composition expressing the feelings of the unfortunate Marie Antoinette, during her imprisonment, trial," &c. One only of this legion of descriptive pieces had escaped the well-deserved oblivion which had attended all the others, Kotzwara's "Battle of Prague," with which the present generation of pianists keep up at least a bowing acquaintance, and which was anything but unknown to the music-sellers. In conclusion, Mr. Hullah said that the only legitimate field for the exercise of musical imitation was comedy—he would almost say burlesque. The province of the musical art was, he repeated, suggestion, not representation; and every attempt at representation by means of musical sounds, whether of "moving accidents by flood or field," natural phenomena, or aught else, must, of necessity, fail—as was proved, if proof were wanting, by its always wanting commentary—notes explanatory of notes; and where such imitation was least imperfect it was, perhaps, most ridiculous. To define, even approximately, true musical expression would be a difficult task,—one, however, which all who studied music could at least partially perform for themselves. Innumerable examples of it were to be found in the best, and perhaps, on the whole, most familiar works of the great composers; those, especially, who have written since the beginning of the last century, who, unlike many of their immediate predecessors, had governed expression, not allowed expression to govern them, and had never forgotten that, without beauty of form, truth in art was incomplete.

Fifteenth Ordinary Meeting.

Wednesday, March 20th, 1867; The Rt. Hon. Stephen Cave, M.P., Vice-President of the Board of Trade, in the Chair.

The following candidates were proposed for election as members of the Society:—

Folliott, William, 12, Idmiston-villas, Forest-gate, S.E.
Lewis, R., 18, St. James's-street, S.W.
McCall, J., C.E., 137, Houndsditch, N.E.

The following candidates were balloted for, and duly elected members of the Society :—

Beaumont, Somerset, 144, Piccadilly, W.
Dunderdale, James, Tiverton-lodge, Cheetham-hill, Manchester.
Hopkin, W. K., 5, New Cavendish-street, W.
Hutchinson, Robert Hopwood, Tenter-house, Rochdale.
Karslake, Sir John B., M.P. (Solicitor-General), 50, Pall-mall, S.W.
Nield, Jonathan, Dunster-house, Rochdale.

The Paper read was—

SUCCESSFUL OYSTER CULTURE.

By Harry Lobb, Esq.

The paper I shall have the honour of reading to you to-night is on the subject of "Successful Oyster Culture," and has been called forth by the dearth of oysters, and the consequent great increase in price of this favourite mollusc. The cause of this dearth is constantly being inquired for. Many reasons have been given, most of them erroneous; I will therefore endeavour to lay before you the true cause of the increase in the price of the oyster, and the way to reduce it to its normal figure, "fourpence a dozen, retail, for the best natives." You must excuse me if I do not refer to the ancient Britons or Romans, or any of the more remote oyster-culturists, as I shall hardly have time to consider more than the last ten years of the science.

The cause of the great price of oysters is their scarcity. The demand for oysters has increased with the population and the facilities for traffic;—the price has increased,—the dredgermen have increased in numbers, and, after having exhausted the home beds, they have done the same with the Scotch and Irish beds, until at length all the available oysters have been eaten up, and none left to re-stock the beds. This state of things is not peculiar to the British Isles; our neighbours found themselves in precisely the same condition about the same time. Singularly enough, the English, unlike their usual method of behaviour in case of difficulty, began to mourn over the loss, and to search for some cosmical cause for the *disease* ravaging their oyster beds. True there was a disease, bearing the fatal name Consumption! but this was not discovered at the time. The French, led by M. Coste, and under Imperial patronage, at once set about to remedy the evil. All my hearers are acquainted with the story of the mason of the Ile de Ré, M. Bœuf, who established the first artificial breeding bed; his success led to an immense industry, where some 2,000 proprietors of beds raised some hundreds of millions of oysters; but as I do not consider the Ile de Ré system adapted to our shores, I pass it over, merely recording the fact, as the first success, and the origin of all future attempts. Let me, however, chronicle a few statistics of the Rivedoux beds, premising that the labour bestowed is not hired, but simply that of the proprietors and their families, at such times as they can spare from their other avocations. The following is the result of the sale of oysters from the beds of Rivedoux, about a mile in length, by 150 yards in width:—From 1859 to 1860, £126; 1860 to 1861, £320; 1861 to 1862, £1,520; and from 1862 to 1863, upwards of £2,000.

M. Coste now took the matter up in a scientific spirit, and having been informed of the complete denudation of oysters of the bason of Arcachon, he turned his attention to this spot. The bason of Arcachon, situated near Bordeaux, is a land-locked indentation of the Bay of Biscay, a narrow channel, admitting the tide. It is a very large area, of almost pure sea-water, two small rivers, the Leyre and the Teste, emptying themselves into it. There is one island, and at low-water very extensive banks are exposed, but at low spring tides there are 2,000 acres laid bare, and between these, deep channels draw off the water from the banks. It was these 2,000 acres M. Coste considered best adapted for his experiments, for being exposed for two hours twice a day during low spring tides, it afforded this time for working the beds, and yet the oysters were covered at all other times. After a month's study, M. Coste made his report, in which he speaks of the bason of Arcachon as "a veritable mine of wealth, which, by judicious cultivation, might be made to yield from its 2,000 acres of bottom, uncovered only at low spring tides, an annual revenue of £600,000." There being no oysters left in the bason for breeding purposes, others had to be brought, and artificial means taken to attract the spawn when given off. M. Coste established two beds, but one, since established, having been more successful, I will give its history. The following is from a report I drew up for the directors of the South of England Oyster Company, on my return from Arcachon last July:—

The bed which has yielded the greatest results is that of Lahillon, created by M. Chaumel, commandant of the brig *Leger*, the government guard-ship in the bason. In the year 1860, M. Chaumel was directed by the Minister of Marine to carry out M. Coste's recommendations as to oyster culture, and to report at regular intervals upon the results effected.

Lahillon is a long strip of sea bottom, 2,700 metres long by 180 broad, and only uncovered for two hours twice a day at low spring tide; it is situated in the middle of a broad channel, bordering the north-east coast of the Ile des Oiseaux. A strong current runs over this bank; this bed lies in the centre of the channel, washing the beds established by M. Coste. M. Chaumel considered this a favourable spot for his attempt, and, consequently, 100 acres of this bottom were thoroughly dredged by the men of the *Leger;* not an oyster was found, on account of the ravages of the whelk, and not a trace of spat; the bottom, which was covered with mud and weeds, was entirely removed to about 18 inches in depth, and the natural sandy bottom of the basin, mixed with shells, was arrived at; this was well covered with all kinds of shells, of which there are immense quantities, principally cockles and oysters. In June, 7,500 tiles were placed, arranged in 270 piles, termed *ruches*, so that the water could circulate freely through them; these tiles are about three feet long by about five inches broad, and are curved, forming about the third of an arc of a circle; they are not glazed, but are more vitrified and less porous than our common English tile; they are rough, and admirably adapted for the purpose for which they are required. They are piled at intervals on each side of a central path, running along the centre of the bed, about 30 to each pile, and rise about two feet from the ground, forming an oblong mass, about the size and shape of an ordinary clothes box. These 100 acres are divided into compartments, first into two, by a long walk lengthways, then smaller paths two feet wide running at right angles to this, and separated from each other by a distance of six feet; four of these divisions form a bed, and each bears a number upon a pole some seven feet high. The usual custom of the oyster-breeders in Arcachon is to lay down the tiles in April and May, when the oysters begin to sicken, but M. Chaumel says that in this case they frequently get covered with weed and mud, whereas he is himself accustomed to lay down his tiles in June and July, when the young oysters are ready to attach themselves, and finding a clean surface favourable to them they readily fix themselves to the tiles.

Upon the bed Lahillon a *ponton* (large boat) is moored in which four men live; they watch the parc, and are constantly at work when the tide serves for their labour; besides these the sailors from the pinnace work at low spring tides for two hours twice a day. Upon the beds, 400,000 full-grown oysters from the adjacent parcs

were laid down, and 400,000 more sea oysters from the Ile de Ré; these oysters, during the following months of June, July, August, September, October, and November, emitted spawn, and the spat adhered to the tiles, shells, and every salient spot. The oysters emit spawn at different times during the aforesaid months, according to their nature and their state of health. The July spat is the largest. My visit to the bed took place upon the 10th of July, and M. Chaumel pointed out to me upon the tiles, oysters about the size of the surface of a split pea, which he said were 20 days old, that is to say had been attached 20 days; he did not reckon the time they had been free, which time is not at all accurately known.

The expense of making the Bed Lahillon was £1,140. The results of the experiment and the returns are as follows, not counting the present season, of which no return has yet been computed:—

Young oysters on tiles	1,255,248
Young oysters attached to parents ..	2,680,000
Young oysters on cultch fascines, &c.	1,246,014
Total	5,181,262
Returns from the sale of oysters	£8,000
Deduct expenses	1,140
Profit realised	£6,860

Besides the above, there remain upon the bed some 15,000,000 not yet fit for market, and of which the value has not yet been computed.

Of the oysters, great numbers are destroyed by the vermin, by the cold, by hail, by the sun, and other causes; in fact, M. Chaumel informed me he considered he lost a quarter of his oysters from these causes; the most destructive of the vermin is the *bigorneau* dog whelk, or piercer; these creatures appear in vast numbers in the spring; they are hatched out from nests, each nest containing about 800 eggs, and each egg 40 individuals; they pierce the shell of the oyster with an organ adapted for the purpose, and the crabs follow in their wake, and soon clean out the dead oyster; one of the duties of the guards is at low spring tides to collect the whelks upon the bed, and one man has been known to pick up 14,600 in the two hours of the low tide.

At the end of the breeding bed, the tiles are laid down, covered with the result of last year's spat; there are from 200 to 300 upon each tile, and they are as close as they can be crowded; attached by their hinges to the tile, with their shells opening outwards, these oysters are exposed to the sun, and are entirely uncovered for two hours twice a day, during low springs, without apparent harm. Upon the bottom of the beds, where the parent oysters are placed, each one is covered with a crop of young, some twelve months old, and they form such a mass upon the shell of the parent, that the old oyster in some instances can hardly be distinguished, and some specimens are the size of a child's head.

All these young oysters are separated from the tiles and from their parents at the end of September and during the following months, and are laid in beds of sand and mud to fatten; they are fit for market at the end of the following September, and during that winter, the largest, of course, being first chosen; so that the oysters from the bason of Arcachon are fit to be eaten when they are 27 months' old; this is at least a year earlier than an English-bred oyster is fit to eat.

A strong westerly gale at spring tide, so as to fill the bason, and then the wind falling, so as to cause a great scour, is considered very favourable for the attachment of the spat; in fact there is no doubt that the great secret for a successful spat is extreme cleanliness. The temperature of the water in the bason of Arcachon is extremely uniform, night and day it varies but little; the nights are mild, and the water in the Bay of Biscay being fed by the Gulf Stream, the temperature is constantly warm. M. Chaumel told me that the average summer temperature is 15° centigrade, and winter 5°. It never freezes at Arcachon, but the hail is sometimes very injurious to the young oysters.

The success obtained by the French naturally excited the desire of those interested in oyster culture in England to effect a like result; from what cause it were invidious to say; this was not done until a fitting site was selected, namely, the Island of Hayling. Here, however, we have almost similar conditions to those found at Arcachon; and no small credit is due to Mr. Hart for the acumen shown by him in his choice of this site. I suppose, if the whole sea-board of England were searched for a site for the cultivation of oysters, none could be found more suitable for the purpose of a breeding bed than the indentation on the east side of Hayling. Here we find an area of about 150 acres, covered at high tide by pure sea-water; a short embankment across the narrow neck would enclose this, and on the water being kept out a short time, the bottom would harden, and would work up into embankments by shingling the surface, and providing proper collectors. A breeding bed, sufficient to produce annually 500,000,000 young oysters, could be prepared in a few months. Mr. Hart, however, profiting by the formation of the Hayling railway embankment, considering that this—enclosing a large area of mud lands—would be the more eligible position, selected the western shore for his works. But before proceeding further, I will say a few words descriptive of Hayling and its fishery.

Hayling island lies at the mouth of a large area of sea water, which runs in from the Solent by two narrow channels on either side of the island, resembling in many respects the bason of Arcachon. The bottom at Hayling is chalk and flint; at Arcachon, sand; otherwise, the mud, the water, the weed, the channels, the mud banks, the protected site, the freedom from storms, from rough seas, from fresh water, are remarkably similar in the two localities. There are 10,000 square acres available for oyster culture; of these only the channels, up to the time of the South of England Oyster Company commencing proceedings, were worked.

The following is a brief history of the Hayling Oyster Fishery:—"In the reign of Henry II. the Emsworth fishery was valued at eight shillings and eight pence per annum to the royal treasury, and the harbour was from a very early date celebrated for the quality of its oysters, which are larger than the Thames natives, but considerably smaller than the Channel oysters. The local fishermen have ever looked upon strangers dredging in the harbours with jealousy, and have done all in their power to prevent it, although they themselves are not as a rule so provident as the deep-sea fishermen, who save their earnings to purchase vessels of larger tonnage and improved build. The harbour fishermen are satisfied to go on in the old routine, and seldom very much improve their position. Formerly the dredgers returned to the sea the young oyster and spat, reserving only the marketable oysters, but after a time they carried away with them all they removed with the dredge, retaining the small oysters to deposit in their own layings. The local men now believed that they were ruined, as the natural beds in the channel were rapidly being rendered barren, and as the demand for oyster beds increased, the lords of manors granted portions of mudlands to persons who cleared them, converting them into layings, and, according to the statute, planted sticks upon their boundaries, so that strangers should not dredge on their private beds. In these beds not only native oysters but Channel oysters were placed for fattening, for sale in the London market. This new system, however, did not suit the Emsworth fishermen, who, enraged at seeing the success of the new system and the destruction of the natural beds, determined to seize the oysters and destroy the artificial beds. They therefore combined amongst themselves, and commenced by attacking the oyster

beds belonging to the Messrs. Russell, in Crastick Lake; this resulted in some fighting, and at the assizes the fishermen at length discovered that they were not allowed to rob other people with impunity. The large dredgers still continue to move all they can get, and, according to some authorities, the dredging so disturbs and scarifies the bottoms and sides of the channels that the multiplication of the oysters is much increased, the spat is moved and distributed, and every year the number obtained increases. The artificial oyster beds contribute to this result, as the spat travels down the channels with the ebb tide, and by this means the area covered by spat is increased; every year we find the number of boats employed in this trade increase. The trade was formerly confined to the winter months, but now it is carried almost through the year. Oysters are obtained from all quarters, and laid in the beds for fattening, and the demand being so large and regular the trade is very remunerative. The best interest of the locality is to encourage this industry, which brings capital and labour into the neighbourhood, and must be of the utmost advantage to all concerned."

This account of the fishery was written some years ago, and very faithfully records its condition at the time; but since then the demand for oysters has considerably increased, and the dredgermen, acting upon the French proverb, "After me the deluge," have every year advanced in their depredations, removing oysters, ware, and spat—the former for market, the latter to lay in their own private beds. Formerly the dredging was continued during the whole open time, so that the bottom was kept clean for the spatting, but as the dredgermen increased in numbers—coming as they did from Whitstable and the Essex rivers, besides the local men—the oysters were removed in less time, therefore the bottom got more foul every year; and one week, in September, 1865, was sufficient to clear away all that was worth taking by the foreign dredgermen; and they all state that there was no trace of spat on account of the foulness of the ground. Thus it may be considered that the old-established Emsworth fishery is destroyed, and unless it becomes worth the while of companies, or private individuals, to cultivate these unproductive bottoms, it will never become re-established by natural means.

The South of England Oyster Company was instituted October, 1865, for the purpose of utilising the portion of mudlands inclosed by the Hayling Railway on the west coast of the island; forty-eight acres are now prepared, but it was found impossible to have the beds ready for the spat of 1866, and only one acre in a pond of four acres was thoroughly shingled and cultched, and eighty large hurdles fixed above the oysters laid down for breeding. On the 14th of June these oysters were observed to be what is termed "sick," and emitting the spawn; on the 15th of July the whole of the under-surface of the hurdles was so thickly covered with minute oysters, as to almost completely hide the bark. The acre of shingle and cultch is also covered with young oysters. The dead reeds and roots of grass bordering the pond, pieces of wood floating on the waters—in fact, every available attachment is thickly covered. This proves how thoroughly adapted the waters and temperature of Hayling are for the breeding of oysters.

It is necessary to understand something of the natural history of the oyster, so as to assist by artificial means the attachment of the spat. The young oysters are emitted from the parent in large numbers, forming a small cloud; each one is separate and independent, and they are not contained in any mucus; each oyster is protected by its shells, which it has the power of closing; beyond the edge of its shell it protrudes what has been termed its swimming pad, a double row of very long cilia, with which it is enabled to swim about in any direction; its usual position is with its swimming pad directed upwards, the hinge of the shell downwards, and its chief motion is upwards and downwards; upon any unexpected motion of the water, it withdraws its cilia, closes the shell, and sinks to the bottom. To the left of the swimming pad is an opening, fringed with cilia, leading to the intestinal tube. The young oysters are fond of attaching themselves together in rows of five or six, or more—the swimming pad of the second to the hinge of the first, and so on—still rapidly swimming. How long this peripatetic condition lasts I do not know; I have had them in a common phial fourteen days, during which time they showed no inclination to attach themselves.

When they do fix themselves, they do so very firmly, by the whole surface of the flat shell, and they cannot be removed without destroying the shell. At Hayling they prefer the clean bark of hurdles, wood, shingle, pieces of slate, &c. At Arcachon they prefer tiles, the external shell of parent oysters, &c. They select dark objects in preference to those of a lighter colour, and always attach themselves to the sides removed from the light; although guided by some law, they appear to be most capricious in the positions selected for attachment.

To show how hardy the spawn of the oyster is, and through what vicissitudes it will pass without injury, I have brought up from Hayling a specimen on the tile. On the 14th of June the oysters in the pond were found to be sick, and emitting spawn; on the 15th of July the spat was discovered attached to the hurdles placed for its reception, therefore during those 31 days the young oysters were free, swimming about the pond; on the east side of the pond is an adit, some hundred yards long; a windmill pumps water from this adit to a large wooden tank, from which the water is constantly running through a series of slate troughs, and from them to two wooden reservoirs; the overflow then runs into the lobster ponds; in these lobster ponds two or three large broken chimney pots were placed, as cover for the lobsters. Upon the inside of one of these pots I broke away this specimen of spat, which, you see, is $1\frac{3}{4}$ inches across the long diameter, by $1\frac{3}{8}$ inches the shorter; on comparing it with the spat on the hurdles, it will be seen to be at least four times the size of the average, the reason being that this one, being by itself, has had all the advantage of the nutritious matter surrounding it, whereas those on the hurdles had to share with their neighbours.

This oyster, whilst in its free condition, and in size almost microscopical, travelled down the hundred yards of adit, was pumped up by the windmill into the tank; here tens of thousands of its fellows were satisfied with their journeying, and attached themselves to the sides and bottom of the tank, this one went on, passed through a long leaden pipe, swam down the six slate troughs, leaving behind some hundreds to attach themselves to the slate, through the two wooden reservoirs, then down an underground drain-pipe, into the lobster pond; here, satisfied with its travels, it attached itself to the inside of the chimney-pot, and flourished, and is the largest specimen I could find.

The young spawn avoid the light; they always attach themselves, where practicable, to the under side of objects. For instance, the hurdles were only covered on the under surface; they swarm under stones to fix to. They are found in large numbers in the holes and cracks of banks. When there are proper materials for attachment they always prefer dark substances, such as slate, or blackstones; the dark in preference to the white wood. I do not think there is an exception to this rule. Again, they like quiet water and warmth, but not the direct rays of the sun; cold rains and hail are very destructive to the young brood. An even temperature, averaging about 62° Fahrenheit, day and night, is that most conducive to the security of the spat.

And now let us glance somewhat cursorily at the late attempts at legislation, for the purpose of arresting the wholesale destruction of the oyster beds. A commission sat for the purpose of studying this question, and, deceived

by the evidence given, most of it being mere guess work, the commissioners issued a report, which I believe to have been the cause of much injury to natural beds. Upon this report the late Government, recognising the necessity for legislation, introduced a Bill, intituled, "An act to facilitate the establishment and improvement and maintenance of oyster and mussel fisheries in Great Britain." The bill was the offspring of the Board of Trade, and was fathered by the then president, Mr. Milner Gibson. Before the third reading, the Conservatives came into office, and Mr. Stephen Cave, whom I am happy to see in the chair this evening, became its step-father. Under its provisions applications were invited by the board, but the act being very vague, and the board wanting information, the first batch of memorials were refused without inquiry. These, however, afforded them information, and they issued a set of regulations, which facilitated matters so far as to point out what they will grant and what they will not.

"I.—*General Principles on which exclusive Rights of "Fishery will be granted.*

"The following comprise the several classes of grants or concessions which appear to the Board of Trade to fall within the scope and intention of the above-named Act, and for which they will be prepared to receive applications :—

"1. Appropriations of moderate areas of unproductive sea-bed or foreshore for the establishment of new fisheries or local depôts.

"2. Appropriations of small areas of already productive ground for oyster layings or depôts in the vicinity of public beds.

"3. Concessions of exclusive fishery rights to owners or occupiers of existing fisheries, but within such limits and conditions only as may make such concessions beneficial to the public.

"Claims for grants coming under any of the following heads cannot, with a due regard to the public advantage, be entertained :—

"1. Appropriations of large areas of already existing public beds or productive dredging ground.

"2. Appropriations of larger extents of ground than the claimants have the means of beneficially cultivating, —whether under the plea of regulating and superintending the fishery, or for any other purpose.

"3. Grants of licensing or sub-letting powers.

"The only ground for appropriating or granting exclusive fishery rights over any portion of the seashore is the expectation that by these means the supply of oysters will be materially increased, and the public thereby benefited. Such expectation must consequently be shown to exist in all cases of grants under this Act, and especially in the case of a grant of already productive dredging ground."

The Board of Trade appear to reason thus: "If the ground is, or has been prolific, we will leave it to the dredgermen to work; but, if any company or capitalist come forward, we will only grant them an unproductive sea bottom, which, should they succeed in making valuable, will be to the public advantage, and will interfere with no vested rights." This is true enough. But what man would be so simple as to invest money to work a sea bottom proved to be unadapted to the purpose? Nature has already pointed out all the situations adapted for oyster culture, by sowing seed everywhere, and, as the seed is in such immense quantities, and free to choose its site for attachment, what with the currents, winds, and other causes, every place adapted for the purpose has been already discovered by the unerring instinct of nature. Almost all the natural breeding beds have been exhausted by reckless dredging. Many of these are now useless, from the cessation of dredging and the consequent accumulation of sludge and vermin; and, even should spawn visit these beds again, there would be no spat, as there would be no clean cultch to offer attachment for the spawn.

Reckless dredging must not be confounded with constant dredging. The former is the result of the selfish policy of taking everything that can be obtained from the natural beds—in fact, destroying them—and is what has been done now for many years, chiefly by the Whitstable men, who seek out every natural bed, wherever it may be, and do not leave it till it is dredged bare. They also encourage others in the same policy, by purchasing everything of the nature of an oyster that may be brought to them. These men, in their corporate capacity, are also examples of the second form of dredging; for they work their beds all the year round, thus keeping them fresh and clean; they move their oysters, destroy vermin, remove weed, in fact, take the greatest care of their growing and fattening beds, consequently turning out a very fine oyster, fetching the highest price in the market, at present £6 the bushel, or 1s. 8d. a dozen retail.

The Board of Trade having taken upon itself the responsibility of legislation to facilitate the formation of private beds, to increase the supply, and, consequently, lower the price of oysters, the public are somewhat disappointed to find that, up to the present time, nothing has been done, and the price of oysters is steadily increasing. It is hoped that this session may not be allowed to pass without some orders under the Act being granted.

The facilities desired by companies and capitalists are something of this nature :—

1. Upon clear proof that hitherto productive areas of sea-bed or foreshore have been rendered unprolific, and that the local or other dredgermen have ceased to work the ground; that exclusive rights of fishery be granted over such areas to fitting applicants.

2. That foreshores, beds of rivers, lakes in harbours, &c., adapted for fattening purposes, shall be granted to applicants upon payment of reasonable royalty to the crown, corporations, lords of manors, &c., who may be proved proprietors of such foreshores, river beds, &c.

Allow me, in conclusion, to recapitulate the principal points in my paper, as follows :—

The cause of the increase in the price of oysters is, their scarcity.

The cause of the scarcity of oysters is, many years of reckless dredging.

The result of the many years of reckless dredging is, the destruction of the natural oyster beds.

The remedy is, the establishment of private breeding beds and the renovation of the natural beds by judicious legislation.

DISCUSSION.

Mr. Cholmondeley Pennell would be glad to have a little more information with regard to the success already achieved at the oyster grounds at Hayling, and as to the future results which were anticipated from them in a commercial point of view. He understood that a large portion of the ground had been cultivated, but would not produce a crop this year. He would observe, with reference to the recent Act of Parliament referred to by Mr. Lobb, that he thought that gentleman took a rather erroneous view of the intention and effect of the regulations by which the Board of Trade proposed to carry out that Act. The Board of Trade having done him the honour to refer to him occasionally in the administration of that Act, perhaps he might venture to say a few words upon the subject. In the first place, he thought it was a misconception to suppose that when Parliament passed that Act they had the intention of making it practically amount to a confiscation of the existing fisheries of the kingdom. Of course where a large public fishery existed, private individuals or associations would be glad if they could readily obtain exclusive possession of it. An oyster fishery was a valuable thing, but it was by no means clear to him how such an appropriation would benefit the public, unless

it could be shown that it would result in an increased supply of oysters. Whether the fishery were worked by a corporation, by private individuals, or by a company, this was the only question to be considered. The object of the Act, as he understood it, was more particularly to promote the creation of new fisheries in this country. As Mr. Lobb had stated, a portion of the coast off Hayling Island was admirably adapted for the cultivation of oysters on the French system. He understood that that was a private undertaking, and required no parliamentary sanction; but supposing it had been public ground, he thought that would have been a proper opportunity for applying the provisions of the Act, so that those who undertook to cultivate that oyster ground might have security in the property they created. With regard to the alleged excessive stringency of the regulations, at all events this had not deterred persons from making applications under the Act, because a number of them had been made, and he hoped it would be found consistent with the public advantage to grant some of them. The administration of that Act had been conferred upon a Board whose liberality and courtesy in dealing with all sorts of commercial matters which came before them was notorious, and one great advantage which oyster cultivation would receive from the new Act was, that the management of the foreshores was transferred from the Woods and Forests to the Board of Trade. That Board had already evidenced its intention of exercising the powers granted by the Act in a liberal spirit, and there was reason to believe it would eventually be a great success. He hoped it would ultimately lead to a great diminution in the price of oysters, for that was the practical point which they all wished to arrive at.

Mr. Lobb said, with regard to the success of the Hayling oyster grounds, the idea was originally to commence operations with a large area of forty or fifty acres, but it was found if the company did that they would waste a year; therefore, some saltings near the beds were purchased, and they commenced at once with a pond of four acres and the adjacent saltings of eight acres; but of the pond of four acres there was only time to get one acre ready, as the bottom was muddy and had to be made firm. First of all sand was thrown over it, then about eighteen inches' depth of shingle, and then, about two feet from the bottom, a series of hurdles were placed; the oysters were laid upon the shingle bottom. On the 14th of June they showed signs of becoming "sick," and on the 15th July following the whole of the under surfaces of the hurdles were covered as thickly as they could be with spat. As he had stated, only one acre out of the four had been as yet cultivated; the remainder was still muddy, and if the spat fell upon the mud it was choked, but he did not suppose any of the spat had fallen upon the mud, because it naturally sought the shingle and hurdles. The value of the spat thus deposited had been variously estimated at from £2,000 to £12,000. The value put upon it by the company was the former sum, but when the oysters were sold next September twelvemonths the real value would be ascertained. The area which would be prepared ready to receive the next spat was about 35 acres, and if the success on that more extended scale was as great as it had been last year on the single acre, the company would have every reason to be satisfied. With regard to the relative temperature of the water at Hayling and Arcachon, no doubt at the latter place it was higher. The average temperature at Hayling in summer was, in the day-time—maximum, 67° Fahr.; minimum, 50°; mean, 62½°. With this steady temperature, there could be no doubt of the success of the operation. Hayling was very warm; it was much protected; the Isle of Wight lay in front of it; it was free from stormy weather; indeed, there was nothing at all inimical to oyster culture. With respect to the administration of the Act of Parliament by the Board of Trade, he hoped the remarks he had made on this subject would not be considered out of place, but he had no idea, when he undertook to write the paper, that so eminent a man as Mr. Cave would occupy the chair; the chairman, however, would be able to correct him, if he had been in error. The memorials for the establishment of oyster fisheries forwarded to the Board of Trade had hitherto been unsuccessful. There were three or four more about to be sent in, and he hoped these would be more fortunate. The Blackwater fishery was an instance in which he thought much good might be done by the interference of the Board. It was 15 miles in length, and, at present, was almost entirely destroyed by reckless over-dredging. What he wanted was that these grounds should be handed over to people who would take care of them, and protect them from over-dredging, so as to greatly increase the produce, and thus benefit the public. The Whitstable bed was a magnificent one, worth many thousands a-year, because it was protected; but if this had been allowed to be over-dredged, as had been the case in other instances, there would have been scarcely an oyster left, or any spat remaining. It had been the same both in France and in England, wherever a natural bed of oysters was discovered, it was dredged bare. The whole of the Solent, one of the most magnificent beds in the kingdom, was now a mass of sludge. It had been dredged till there was not an oyster left, except in one place, where the rush of water was so great that it kept the bottom clean, but all the other beds were one mass of sludge. It was the same with the Emsworth fisheries; there was no trace of spat there this year, and every oyster was removed in a week or two which ought to have afforded several months of dredging.

The Chairman said there were certain points in Mr. Lobb's able and interesting paper from which he disagreed to a certain extent, but these were matters of detail rather than of principle. He thought the general result of Mr. Lobb's statements had been to show that, on principle and on general grounds, the action of the Government had been entirely right in this matter. Mr. Lobb stated that the Commission which sat on this question was deceived by the evidence given being mere guess-work; but those Commissioners conducted their investigations for more than two years, and when he mentioned the name of Professor Huxley as one of them, it was a sufficient guarantee that great care and scientific knowledge were exercised in the investigation. He might say, having been the president of a commission which went to France last winter to negociate a Fishing Convention with the French Government, he found that the report of the commission which Mr. Lobb had spoken of and the whole of the evidence had been translated into French, and was considered in France to be a very valuable document. It was not correct to say that he (the Chairman) was the stepfather of Mr. Milner Gibson's Bill, and that he took it up on the third reading. The fact was, the Bill had been read a second time only, and he introduced several alterations in committee before the Bill passed the House, and he thought some of them would go far to accomplish what Mr. Lobb had expressed in his paper. The Act itself, Mr. Lobb said, was very vague, but Acts of Parliament were generally very vague. They laid down certain principles; it was impossible to go accurately into details. It was not correct to say that the first batch of memorials under this Act were refused without inquiry. Those memorials came before him, and great inquiry was made upon them. No doubt Government was anxious before coming to a decision to settle some definite rules on which to act, and it was no great blame to the Government if they sought for further information before taking action in a matter which was quite new, for the Act was only passed in July last year. As we were only now in March of the following year he did not think any extreme delay had taken place. He saw in a little book, written by the author of the paper,

it was stated in the preface that it would probably take twenty years to effect the objects he had in view. If that was so—and probably Mr. Lobb was right—he (the Chairman) did not think the few months that had elapsed since the passing of the Act should be regarded as waste of time in proceeding cautiously before granting the applications that had been made under this Act. They must know in the first place that the Crown rights upon the foreshores of the sea or tidal waters between high and low water marks, which had been under the administration of the Office of Woods and Forests, had been lately transferred to the Board of Trade; but the ownership of the Crown must be regarded as a mere trusteeship for the public. The Crown should protect the rights of the public in them, and if it granted them exclusively for certain terms of years to particular persons applying for them, this must be done in the interests of the public. There were certain applications which Mr. Lobb had specially referred to—viz., for the Blackwater and the Solent. Both these were very large areas, and those gentlemen who applied for the Solent wished to have the entire control over that large sea, not only for the cultivation of oysters themselves, but to give licenses to other people to cultivate them; or, if they thought it necessary, to shut up the fishery altogether for two years, much as the Dutch used to burn nutmegs to prevent them becoming too cheap. These applications were naturally refused, because the areas were too large. The object of the Act was to do as far as possible what the French had done on their coasts. What the French desired was, not to bring large companies to bear upon these great areas, but to bring individual enterprise, or small associations of men to bear upon them. It was considered that there was a dog-in-the-manger feeling on the part of large companies. They collected all they could gather for themselves and wished to keep out all others. He spoke on this subject generally: he had not any individual case on his mind. In the interest of the public no doubt small areas should be given. The French granted very small allotments, and the Minister of Marine informed him that his view was to let every individual have his own private oyster park, as it was thought under that system the culture would be carried out more satisfactorily than if the trade was monopolised by large companies. He thought Mr. Lobb had misunderstood the first clause of the general principles which he had quoted, which stated the concessions under the Act to be "Appropriations of moderate areas of unprotected sea-bed, or foreshore, for the establishment of new fisheries or local depots." Mr. Lobb thought very naturally that nobody would be likely to cultivate anything which was quite certain to produce nothing. It would not be common sense to do so; but in this case he (the Chairman) thought the word "unproductive" meant what was not *now* producing anything, and as a sort of defence of this expression he would quote the words of the paper with regard to the Emsworth fishery, in which Mr. Lobb said, "Unless it becomes worth the while of companies or private individuals to cultivate these 'unproductive' bottoms, it will never become re-established." What Mr. Lobb there meant by the word "unproductive" was precisely what the Government meant by it in these general rules. It simply meant that which was not now producing anything, either because it had been over-dredged and destroyed, or because it had never been tried. Mr. Lobb had shown that there were parts of the coast which were considered hopeless for the cultivation of oysters, because there was nothing naturally for the spat to take hold of, but he had shown them to-night that if they laid down tiles or hurdles they enabled the spat to take hold. That was exactly the point the Government took. On the north-west coast of England there were, long before this Act was passed, artificial oyster fisheries, which failed for want of protection by law. This was sought to be remedied by the Act of last session; and the Bill now before the House of Lords gave the same protection from depredations in the case of oyster beds as was now afforded by the game laws in the case of game on an estate. In former days, if they caught a man "red-handed" taking oysters from a bed, they could punish him for the theft; but, if he was five yards away from the bed, they could not ask him where he got the oysters, any more than, under the old game laws, they could demand that a man should account for the possession of any pheasants or partridges found upon him. Therefore, it was clear that being the state of the law, there was little inducement for persons to spend money to form these oyster beds, because there was no legal protection to the property. In this respect the Act of last session was not entirely satisfactory, inasmuch as, while it protected the fisheries formed under that Act, it left those which were formed before the passing of the Act without this remedy, and he thought the Hayling Company complained of this very justly; and, though he (the chairman) did not see his way, at the time Mr. Lobb spoke to him on the subject, to remedy the defect, he had seen it since, and he hoped he had now done it effectually. As to the general question, what was the object of this legislation, he was aware it was popularly considered better to leave everything free—that fish should be left free to those who could catch them, the supply being practically inexhaustible; but the case of oysters was no doubt different. Mr. Lobb had stated very truly that the oyster beds on our coasts had been overdredged. But what was the reason? Simply because the demand for oysters was much greater than it used to be. Persons of his own age recollected the time when barrels of oysters were sent from London by the coaches into the principal towns; but now every little town got its supply of oysters fresh by railway, and the consumption of them was enormous. We might have prevented the over-dredging in the same way as the French had done, but we must recollect the difference between a paternal government and our own. It was, moreover, remarkable that though the French had been very strict in their fishery laws, while we have been rather lax, notwithstanding this, the price of oysters in Paris was higher than in London. The only way in which we could stop over-dredging in the public beds was by a strict enforcement of the fence-months; but if there were considerably too many dredgers during the open months of the year, the beds were dredged bare. What was the remedy for this? Mr. Lobb had pointed to it in his little book, in which he laid it down as an axiom that the natural oyster beds of the United Kingdom were nearly exhausted, and thus "private breeding beds have become an actual necessity." That was the whole case. Mr. Lobb and himself were entirely agreed on this point—that we could not rely on the public beds any longer, but we must come to the private beds, and that every possible facility ought to be given for the formation of such beds. At the same time it must be recollected that there are public beds, and we must respect public rights. It might do for a paternal Government, like that of France, to say they would take upon themselves to do what they considered best for the public generally; but in legislation we could not always do that, and must often respect existing rights however absurdly they operate. In the case of the Blackwater there had always been a public trade, and the fishermen had been in the habit of dredging it year after year; but if Government were at once to divide the whole of the Blackwater amongst different companies a considerable amount of public discontent would be caused. Therefore, in a case of this kind, as in many others, legislation must be based upon compromise. They must take public opinion with them, and must feel their way to every step before they took it, particularly in so delicate a matter as this. He had detained the meeting for a considerable time, but, holding the position he did, he thought it proper he should explain as carefully as he could the points on which legislation

on this subject had been based. He had probably eaten oysters in as many parts of the world as most people. He had eaten those which hung on trees in South America; he had also eaten the enormous oysters of North America, two or three of which were sufficient to make a great dish of soup; he had also eaten the classic oysters of Baiæ, near Naples; and the green oysters of Ostend and other places; but he must say, in all his experience, he had found none equal to what were known as "natives" in this country; and his own personal feeling, as well as the interests of the public, would lead him to desire to increase as much as possible the supply of so highly valuable and popular an article of food. He would now propose a hearty vote of thanks to Mr. Lobb for his most interesting paper. He felt personally obliged to that gentleman for the remarks he had made upon legislation, because they had given him an opportunity of explaining, as clearly as he could, and without the slightest desire to say a word against what Mr. Lobb had written, the objects and purposes of recent legislation, as bearing upon this subject.

The vote of thanks was then passed, and acknowledged by Mr. Lobb.

Proceedings of Institutions.

Sherwood Mutual Improvement Society, Battersea.—The last report says that the number of members has greatly increased during the year. The course of fifteen lectures which have been delivered was most successful. The committee beg to express their thanks to Mr. G. Payne for his instructive lecture on chemistry, also to Mr. Roberts, sen., for his interesting displays of dissolving views. The library now consists of nearly 3,000 volumes; a new case has been made for them, and the whole insured against loss by fire. A catalogue has also been prepared. Various classes have been formed, viz., a drawing, vocal, and an elementary class. The two first were successful, but the last was not well attended. A mutual arrangement was made with the Young Man's Christian Association, Wandsworth, for an exchange of a limited number of tickets, which enabled many of the members to enjoy the privilege of hearing a very excellent course of lectures (in addition to their own), of which many availed themselves. The balance-sheet shows that the receipts have been £266 7s. 2d., and that there is a balance in hand of £68 16s. 1d.

ENGLISH MEDICINAL RHUBARB AND HENBANE.

By Rufus Usher, Esq.

Although the introduction of medicinal rhubarb into England is dated by Parkinson as far back as 1629, no real experiments in its culture and preparation for medical use appear to have been made till 1762, when a quantity of seed was sent from Russia, by Dr. Mounsey, from which period till about 1800 it was successfully grown in small quantities by many scientific men, after which it was cultivated at Banbury on an increasing scale, and is now known in the commercial world as a general article of trade; and not only is it consumed in considerable quantities in this country, but it is exported largely to various parts of the civilised world. The origin of the plantations of rhubarb in my possession, and now extending over forty acres, will be best traced by the following extracts from the "Transactions of the Society of Arts." In 1789:—"The Society, in consideration of his merit, and to promote as much as in them lies the growth and cultivation of so valuable a drug, voted their silver medal to Mr. Hayward, as a bounty." In 1794:—"The following accounts and certificates respecting the growth and cure of rhubarb having been received, the gold medal, being the premium offered for cultivating the greatest number of plants, was adjudged to Mr. William Hayward, of Banbury." The following is the testimony of Dr. Pereira:—"In 1789 Dr. Hayward obtained a silver medal, and in 1794 a gold medal, from the Society of Arts, for the cultivation of English rhubarb. Dr. Hayward died in 1811, and the plants were purchased by Mr. P. Usher."

As a proof that even at this early period of its cultivation English rhubarb had obtained the confidence of scientific men, it may be stated that, in 1798, rhubarb of British growth was used at St. Bartholomew's, St. Thomas's, and Guy's Hospitals, and was being experimented on at several others. According to the testimony of Sir Alexander Dick and Dr. Hope, of Edinburgh, in 1784, but little rhubarb was used by the apothecaries of that city but what was produced in Scotland, and it was considered in no respect inferior to Russian. About the same time English rhubarb was put to a severe test at Bath, by Drs. Falconer, Parry, and Fothergill, all of whom attested its merits. Dr. Falconer remarked, that two of the specimens submitted to them answered in external marks to the character of the foreign; that they were rather inferior in delicacy of taste to the Turkey, but superior in other respects to East India. In 1810 Dr. Thornton, then lecturer on botany at Guy's Hospital, referring to the encouragement given to the cultivators by the Society of Arts, makes these remarks:—"This account may serve to show both the ardour of this respectable Society in encouraging the growth of this useful article and the persevering industry of some gentlemen in overcoming all the difficulties attendant on introducing a new plant into cultivation—finding out the means of curing it as an article for extensive sale, and overcoming the prejudices of such as cannot persuade themselves that a drug of British growth can bear competition with what is sent us from foreign countries."

If at a later date the prejudice against English rhubarb having increased, there must have been other causes than those existing in the first introduction of the plant. One cause of the subsequent change in public opinion may have arisen from the partial introduction of new varieties of the plant. From the earliest period in its history there appears to have been a confusedness in the evidence as to its real character; and whether foreign rhubarb is produced from the *Rheum palmatum*, or the *Rheum undulatum*, yet remains an unsettled question. As far as this question relates to rhubarb grown in Great Britain, the stronger probability is, that, after it was imported, several varieties were produced by repeatedly propagating from seed, when a discrepancy was observed, at variance with the earliest descriptions recorded. To show the extent of those changes, I may remark that in the last instance in which I noticed the effect of seedling cultivation, about thirty years since, I found the stalks and leaves more than double the size of those produced from off-sets, a circumstance sufficient to account for the introduction of such varieties as the Victoria and other large sorts now so common in our gardens, and which, when propagated from seed, still keep working change upon change. So convinced have I been for a long time of the injurious tendency of this system, that I have studiously avoided the use of seed altogether; and the plant has so far receded to its original type, that not one has produced ripened seed during the last twenty years. It is a fixed trait in the cultivation of medicinal rhubarb, as it is in most bulbous plants, that if produced from off-sets only, it ceases to produce seed, and if raised from seed each succeeding generation produces seed also, adding variety to variety almost indefinitely. Assuming, as an incontrovertible fact, that the plant has now for such a lengthened period been propagated from off-sets as to be incapable of bearing seed, it will guarantee the conclusion that if, during a number of years, when its cultivation was pursued by a larger number of growers, for the purpose of making experiments, and each one, in haste to enlarge its growth,

resorted to seed propagation, it degenerated from external causes, it is equally logical to infer that, the causes having ceased which led to its deterioration, it has now regained its specific distinctiveness, and is not likely to diverge again into any transition from its central type. It is thus quite possible to account for the previous deterioration of the plant for medical uses, which caused the strong prejudice existing for many years against it, and some remaining doubts are still expressed respecting the real properties of English rhubarb; but that a powerful reaction has taken place in its favour since the plant has been restored to its primitive form of development, there is most ample testimony, not only in the increased demand for it at home and abroad, but in the evidence of eminent medical practitioners. In addition to the improvement which became apparent in the plant by the entire exclusion of seedlings, an important change has been effected in the mode of drying, by exchanging a high artificial temperature for a more gradual one; the process in the first stages being effected by the application of a strong current of atmospheric air, which has not only greatly condensed the root, and rendered it less porous, but has given it an appearance approximating more closely to foreign.

The progressive but certain destruction of all former prejudices existing against the use of English rhubarb, may be adduced from facts much stronger than theory. The first is that as recently as 1845, the extent of land appropriated to the cultivation of the plant did not reach ten acres, whereas now it has reached upwards of forty acres, and even this is quite insufficient to supply the foreign demand for trimmed English rhubarb. If the home consumption of this drug had remained stationary, the export trade alone would have afforded every facility for extending the plantation, a fact most strikingly shown by the article being sent to ports, such as Odessa, from which East India rhubarb is sent to Great Britain.

Even where regulations of the most stringent character have been put in force to prevent the use of either inferior or adulterated drugs, English rhubarb has passed the ordeal in safety. The following is a portion of one of the statutes of the United States of America, entitled, "An Act to prevent the Importation of Adulterated and Spurious Drugs and Medicines." Thirtieth Congress, Chapter 70th, date 1848; Section 1st provides—"That from and after the passage of this Act, all drugs, medicines, medicinal preparations, &c., imported into the United States from abroad, shall, before passing the Customs-house, be examined, as well in reference to their purity and fitness for medical purposes, as to their value and identity specified in the invoice." Section 3rd provides—"That if, on examination, any drugs, medicines, medicinal preparations, whether chemical or otherwise, are found, in the opinion of the examiner, to be so far adulterated, or in any manner deteriorated as to render them inferior in strength and purity to the standard established by the United States, Edinburgh, London, French, and German pharmacopœias and dispensatories, and thereby improper, unsafe, or dangerous to be used for medicinal purposes, a return to that effect shall be made upon the invoice, and the articles so noted shall not pass the Customs-house, unless, on a strictly analytical character called for by the owner or consignee, the return of the examiner shall be found erroneous." To carry into effect the provisions of this Act, qualified examiners of drugs were appointed, at salaries varying from one thousand to sixteen hundred dollars per annum, at the ports of New York, Boston, Philadelphia, Baltimore, Charleston, and New Orleans.

A large proportion of my trimmed rhubarb for several years passed through the hands of Messrs. David Taylor and Sons, for shipment to the American market, where it became a regular article of commerce.

From the year 1855 to the present period the demand for English rhubarb has far exceeded my means of supplying it; and the ratio in which the increasing demand is taking place far exceeds the propagating capacity of the plant. The period when the rapidly increasing demand for export took place, was that immediately succeeding the investigation of the question by a Committee of the House of Commons, during the sessions of 1855 and 1856. It will be recollected that a committee was appointed, of which Mr. W. Scholefield, member for Birmingham, was chairman, to invest the question of adulteration of food, drink, and drugs. During the sitting of this committee a large number of witnesses were examined on the question of English rhubarb, with varying results as to the individual opinion of the parties examined. Some, amongst whom may be named Dr. Hassall, contended it was practicable to carry out a system of absolute purity in drugs and chemicals; whilst others, with equally practical views, contended that a classification as to the quality of these articles must always exist. I need scarcely say that the evidence adduced on the question of the adulteration of drugs, as of other things, was very conflicting and inconclusive. At the commencement of the second session occupied by the committee in this investigation I was summoned, on the 5th March, 1856, to give evidence on the long-vexed question of English rhubarb; but both as regards my own and the evidence of other parties, which fully shows the importance of the question raised, I can do no more in this paper than refer the reader to the Blue Book for an exposition of the whole affair. But to show that my position was not damaged by the result, I quote the following words of the Chairman of the committee at the close of my examination:—"If it be represented to the committee that English rhubarb is sold as an adulterating article, and is of a very inferior quality to foreign, that is a mistake; for medical men attribute very important medicinal qualities to English rhubarb, and it is consumed in some important public establishments, and is held by very high medical testimony to be an exceedingly useful medicine." One of the public establishments referred to here is the London Hospital, where English rhubarb alone had then been used for a number of years. The inquiry carried on before the committee was kept alive, to a great extent, owing to what was represented to be the extreme difference in the money value between foreign and English rhubarb; and it was on this point that I had to complain of some unfairness. One witness stated the difference as great as between 11s. per pound on the one side and 4d. on the other. Here the retail price of foreign was quoted, the average wholesale price of China rhubarb for the 12 months previous being only 5s. 6d., whilst as to quality, the maximum of one was set up against the minimum of the other, as I was, at the very time the evidence was taken, entering English rhubarb for shipment at 2s. per pound to Messrs. Taylor, Brothers, Mark-lane.

A great error, almost invariably committed in passing judgment on any article of supposed inferiority, is to judge it by an improper standard. This has been strictly so in the present instance. To show that one sample is of bad quality, is certainly not proving that another is good; but when an attempt has been made to prejudice the public against the use of English rhubarb, it has sometimes been done by putting it into competition with the very choicest specimens of the foreign article; and I believe that all the comparisons, including the testimonials also, have been made on this principle. If it is true that a great difference exists in samples of drugs generally, it is yet more so in those of foreign rhubarb. It is well known that but a very small proportion of imported rhubarb is of the best quality. This fact did not escape the notice of Dr. Pereira. He remarks, that when China or East India rhubarb arrives in London, it is hand-picked, tared, and sorted into three qualities —bright and sound, dark and horny, and worm-eaten. He adds the following evidence on this point:—"In 1840, when China rhubarb was very scarce, a quantity of foreign rhubarb, imported from Calcutta, was sold, some at 4d. and some at 1d. per pound." As the evidence arising from dissimilarity of price has been used as an

argument to show the inferiority of English to foreign, the following facts deserve notice:—In the years 1846 and 1847, there was a very large quantity of foreign rhubarb disposed of, amounting to several tons weight, and such was its general quality and condition, that the terms made use of to designate it, with the prices realized, were as follows:—Old and bastard, at ½d. to 1½d. per pound.; old brown and rotten, 1d. to 4d.; rotten and damaged, 3d. to 5d.; brown, old, and perished, 1d. to 6d. During these periods large quantities of English were sold at from 1s. to 2s. per pound. Thus it is seen, that if the maximum price of foreign is higher than English, the minimum price of English is higher than foreign. Whatever, therefore, may be supposed to be the relative difference between English rhubarb and the best specimens of foreign, it is clear that, owing to the very imperfect method of curing it in those countries where it is produced, there is invariably that strict uniformity of character in the one which is as invariably wanting in the other.

One leading question relating to this most important medicinal production yet remains to be solved at some future period, namely, whether the plant from which foreign rhubarb is produced is the best that could be selected? Judging from the very great variety and very interesting specimens in the possession of Dr. Hooker, all of them distinctly differing from each other, it would appear doubtful if the foreign cultivators have made such researches and instituted such experiments as would lead to a judicious selection of the best sorts. It is also highly probable that, if offsets could be obtained from a number of the several varieties of the plant produced in Tartary and elsewhere, we might acclimatise some yielding higher medical properties than any yet cultivated in Great Britain; but as the means of obtaining them is entirely out of my power, I can only say, that if I could be assisted in procuring them, I should feel great pleasure in carrying out such a series of experiments as might ultimately render an important addition to the medicinal productions of the nation.

My attention has recently been called to the subject of the preparation of that very important medicine, tincture of henbane, in consequence of the very erroneous views entertained with regard to the character of the plant, and to the somewhat scanty, if not imperfect directions, contained in the new pharmacopœia respecting its preparation for use. It is out of my province altogether, as a grower and preparer only of medicinal plants, to call in question the correctness of the pharmacopœia from any other point of view than that of an omission. The directions given in this work for the preparation of tincture of henbane are, to use "the leaves and branches of the indigenous biennial plant dried, when about two-thirds of the flowers are expanded." Now I believe that almost every wholesale druggist in the kingdom will endorse my statement, when I say that up to the year 1862 but a fractional part of the tincture of henbane prepared in this country was made from the blossoming biennial plant; a circumstance not so much reflecting discredit on those who prepare and supply the article for use, as arising from the absolute impossibility of procuring the material to carry out the instructions of the pharmacopœia. If the question is asked, why the blossoming biennial plant had not, up to that period, been produced in sufficient quantity to supply the demand, I reply that, owing to the almost invariable attack made on the plant during the autumn and winter months by the wireworm, slug, and other destructive visitants, but a small proportion survives till the ensuing spring. Either the root is bitten through in several places or the bud entirely consumed. To this it must be added, that of the plants which escape this ordeal, when they have reached that stage of their development pointed out in the pharmacopœia, namely, "when two-thirds of the flowers are expanded," the quantity of foliage is very scanty, and it will only pay the producer at a high price.

Through some erroneous impression, that has long existed, and still continues to exist, respecting this very important plant, the first year's growth is spoken of as the annual, than which nothing can be more palpably wrong, as the two articles, when prepared for use, vary as essentially in their external appearance as in their constituent properties; applying this simple test only, that the annual plant, when dried, consists both of leaves and blossom, whereas the first year's growth of the biennial must necessarily consist of leaves only. Assuming that, when the second year's growth of the biennial plant cannot be procured, recourse must be had to the first year's growth as a substitute, the pharmacopœia should have made known the comparative strength of the latter. No objection could have been made to such directions, when it could be shown that a second-class article must of necessity supplant a superior one, as occurs, doubtless, not only in this but in many other medicinal preparations. If, in the use of the two separate articles now under consideration, the same instructions are carried out, namely, to use two ounces and a half of the dried plant for a pint of tincture, and one should prove to possess two or three times the strength of the other, it assumes a serious aspect in the administration of so very important a medicine. We require a new definition altogether of the plant when dried for use. Instead of making two divisions only, as at present, annual and biennial, it should be classified as follows:—

Biennial henbane of second year's growth.
Biennial henbane of first year's growth.
British annual henbane.
German henbane.

This would at once simplify the question, and prevent those erroneous views which have very widely prevailed amongst all parties concerned in its preparation and use. It will be seen that I have arranged the above classes in the order of their value. The two last-mentioned—the British annual and the German—although most extensively used, are so thoroughly undeserving notice, that they require mention only to guard the public against their use altogether. Of these two, the British annual is perhaps preferable to the foreign, and its appearance, unfortunately, approximates sufficiently close to the second year's growth of the biennial plant to enable the vendor to pass it as such; but if no other criterion existed than that it possesses no flavour, or aroma, that would be sufficient to detect the imposture. Independently of this test, the leaves will be found much shorter; and occasionally will be seen a pure primrose blossom, which never occurs in the beautifully streaked blossom of the biennial; but the very fact of the appearance of blossom in the sample, that blossom being generally so much like the blossom of the biennial, leads to the very erroneous conclusion that it is the same plant.

Owing to the extreme price which the dried biennial plant of the second year's growth has realised in former years, the consumers have not given that encouragement to its production which its intrinsic value merits. The great difficulty, however, which has thus been felt till very recently—that of not being able to obtain a supply except at a most exorbitant price—is now to a great extent obviated. From a long, careful, and continuous study of the cultivation of biennial henbane, I have at length so far succeeded in preserving it from the attacks of insects, to which it is ordinarily subject, and have to such an extent economised the system of drying the plant, as now to bring the price within reasonable bounds, and to leave those who prepare the tincture of this valuable plant without any just excuse for using an inferior article.

This is not an age in which scientific research can be long baffled in its inquiries; and as the articles in ques-

tion will be placed before the public in the Paris Exhibition of 1867 (class 44), no more will be anticipated from their inspection by a competent tribunal than the closest scrutiny will justify.

Fine Arts.

National Portrait Exhibition.—The exhibition of last year is officially declared to have been "very successful." "During the 18 weeks it was open it was attended by 73,000 visitors." In order to record the general appearance of the galleries, and the position in which the pictures were hung, 77 photographic views have been taken and published of the bays of the exhibition. And, for the purpose of affording to artists and others examples of court costume, nine photographs, on a large scale, have been executed from the most important portraits of the Tudor period.

Photographs taken for the Department of Science and Art.—The arrangement, of which we have already given notice, for the sale of these photographs by the Arundel Society, is now complete, and a classified list has been published. The catalogue comprises photographs from national portraits and miniatures, cartoons and drawings by Raphael and Michael Angelo, Holbein drawings at Windsor, works by Mulready, "Liber Studiorum," by Turner, Italian sculpture, &c.; also objects of decorative art in precious metals, porcelain, crystal, enamel, ivory, &c., belonging to, or placed on loan at, the Kensington Museum. The entire series comprises upwards of two thousand photographs. It is also announced that "Artists, manufacturers, and the public generally, may obtain negatives from the objects in the permanent collections in the Art Museum," at a rate of charge ranging from 10s. to £1 10s. Negatives are also taken of all works on loan, and two prints presented to the proprietor. Photographs which may be deemed calculated to promote art education, are circulated among the schools of the kingdom. The general intention of the above arrangement is to promote the knowledge of art throughout the country. Full information can be obtained either at South Kensington Museum or at the offices of the Arundel Society, in Old Bond-street.

Commerce.

The Nutmeg.—For many years the Straits settlements were famed for the cultivation of the nutmeg. At Penang, in Province Wellesley, at Malacca, and at Singapore, the cultivation of this spice seemed to be attended with very gratifying success. Young trees were set out in every direction in plantations, and everywhere they appeared to thrive, and to yield a very fair supply of nutmegs. The nutmeg tree has a pretty appearance, running up to a height of from 25 to 30 feet, with numerous branches shooting directly out at right angles from the stem, and the leaves are of a fine green colour at the top, and of a paler hue on the under surface. Strange as it may seem (says the *Produce Markets Review*) the cultivation of this spice tree has apparently declined. In fact, of late years, it has become a losing business. Everywhere through the Straits it is now pronounced a failure. As a substitute for this branch of industry, the planters are setting out their lands with cocoa-nuts. Whether the substitution of the cocoa-nut cultivation for the nutmeg will prove an equally valuable product is yet undetermined. Of course there are other places where the nutmeg will be still grown. It is said to be indigenous to the Molucca Islands, and to parts of Java. It grows to some extent in Ceylon, almost by the side of the cinnamon and coffee trees. It has been introduced into the Mauritius, and into some of the West India Islands. However much the loss of the spice trade may be regretted by friends of the Straits, the markets of Europe and of the East will never fail, of course, of receiving their supplies from other places.

Obituary.

Mr. John Bethell, the patentee of the creosoting process for preserving timber, died in London, in the early part of the present month, at the age of 64. He was the only brother of Lord Westbury. *Engineering* states that Mr. Bethell took his idea of preserving wood by creosote from the embalming of mummies, the creosote having the property of coagulating albumen. Coal tar contains a considerable quantity of creosote, and when boiled to expel its ammonia it is called coal oil. The proportion of creosote in this oil is ascertained by mixing it with 10 per cent. of its own bulk of a strong caustic alkaline solution. After shaking and settling, three layers will be formed—the lower layer of caustic alkali, the next, forming from 8 to 18 per cent. of the whole, being creosote, while the bituminous oils float at the top. Mr. Bethell joined the Institution of Civil Engineers as an Associate, March 20th, 1838, but did not become a member. His creosoting patent was dated July 11th, 1838. He took out several patents, including ploughing engines, steatite bearings for carriages, and improvements in agriculture. He was at the time of his death chairman of the British and Foreign Railway Plant Company. He was elected a Member of the Society of Arts in 1853, and not unfrequently spoke at its meetings.

Publications Issued.

Successful Oyster Culture. By Harry Lobb, Esq., (*Ridgway, Piccadilly.*) Price 1s. This pamphlet gives an account of the success obtained at the Ile de Ré, Arcachon, and at Hayling Island, near Portsmouth, by the modern system of oyster culture; with extracts from the *Times*, the *Field*, and other papers. The system carried on at Hayling appears to promise great results, and should be witnessed by all desirous of entering upon this new field of industry.

Notes.

Southern Counties Association.—A meeting of the Council was recently held at the house of the Society of Arts; present—Viscount Eversley, in the chair; Hon. and Rev. S. Best, Mr. Beynon, M.P., Mr. Clutton, Lieut.-Col. Deedes, Lieut.-Col. Lennard, Mr. Lyall, Sir H. St. John Mildmay, Bart., Mr. Melville Portal, Mr. J. C. Ramsden, Mr. Rigden, Mr. R. J. Spiers, Rev. T. C. Wilks, Mr. Wise; Rev. James Beck and Mr. Shute, secretaries. A considerable number of members were admitted, among whom may be mentioned, Major Aldridge, Knepp Castle, Horsham; Captain B. B. Barttelot, Findon-place, Worthing; Mr. Thomas Bell, the Wakes, Selborne, Hants; Mr. George Blaker, Pilcomb, Hurstpierpoint; Mr. J. Bonham Carter, M.P., Adhurst St. Mary, Petersfield; Rev. G. A. Clarkson, Amberley Vicarage, Arundel; Mr. E. W. Cooke, R.A.; Mr. W. H. Dunn, Inglewood-house, Hungerford; Mr. I. P. Fearon, Ockenden-house, Cuckfield; Mr. A. J. Beresford Hope, M.P., Bedgebury-park, Goudhurst; the Bishop of Oxford; Rev. F. Parsons, Selborne, Hants; Mr. Wm. Saxby, Rottingdean, Brighton; Rev. E. St. John, Finchampstead, Wokingham; Mr. F. Tupper, West Ham, Hurst-green; Mr. Wm. Webb Turner, Chyngton, Seaford, &c. The proposed plan of the show-yard at Hove, and estimate for the supply and erection of shedding and offices, were submitted to the Council by

Mr. Henry Manning, late contractor to the Royal Agricultural Society, and the secretary was authorised to sign a preliminary contract with him for the amount of £587, capable of extension after the 1st of May, should the number of entries render it requisite. In reference to the exhibition of works of art in the Pavilion being kept open by the mayor and corporation of Brighton for a month after the closing of the show of the association, the secretary was directed to inform the mayor that the only guarantee they would require from the corporation for the safe custody of the property handed over to them was what they themselves give to the lenders—viz., that of extreme vigilance. The following stewards of the Brighton Show were then chosen:—Stock: Sir Archibald K. Macdonald, Bart., Mr. George Shackel, Mr. James Singer Turner, and Mr. Richard Woodman. Horses: the Earl of Portsmouth and Mr. T. Pain. Implements: Lieut.-Colonel Deedes and Mr. P. S. Punnett. Poultry: Mr. H. F. Stocker and Mr. Turner. Mr. George Darby, of Marklye, Warbleton, was unanimously elected a vice-president for Sussex, in the room of Sir J. Villiers Shelley, Bart., deceased. The Council adjourned to Wednesday, April 10.

Correspondence.

THE GOVERNMENT AND THE TELEGRAPH.

Sir,—I regret that some pressing engagements have delayed my answer to the question put to me by letter, in the *Journal*, by Mr. Hawkins Simpson, *i.e.*, whether I think that, either at the present time or in future years, it would be for the public interest to prevent the despatch of telegrams by private enterprise; or, in other words, do I "wish the Government to monopolise the use of electricity for the purpose of conveying information to the public." I conceive that, on a due consideration of the tenor of my paper, it might be perceived that my chief wish is that the Government should make free to us, the public, the full use of our own establishments—should make free to us the means of communication which science has given us—and should free us from exactions on our necessities by irresponsible traders, who, under the guise of competition, have obtained joint and sometimes separate monopolies of the necessarily imperfect and necessarily dear use of those means. I believe that the conveyance of telegraphic messages, as well as the conveyance of letters by post, may and ought to be so conducted, as a responsible public service, as to leave no chance for private trading competition, and no need of any penalties for protection against it.

There are now penalties on our statute books against the sending or conveying any letters by post, but they appear to have fallen into disuetude. Nevertheless, we know that on occasions of emergency persons do send letters, tied up as parcels, by railway or by coach, to insure a special delivery earlier than is provided by post, and I think that—except, perhaps, for ocean transit, for which heavily subsidised mail packets are provided—all persons should be left free to do so, the occasions for using the privilege being comparatively few, and the necessary extra charge being itself a sufficient protection against any evasion of moment against the revenue. Moreover, the entire freedom of conveyance should serve as a stimulus to the public servants, so to improve their deliveries at all points for payments as for a service, as to leave private speculators no chance of doing anything the like for any profit over and above the actual cost of the service. I therefore consider that penalties are a remnant of conditions of protectionism, from which, as engendering stagnancy and slowness, the postal service should be purified. And so with telegraphic communication. Private individuals, manufacturers, traders, and gentlemen should be left free to carry telegraphic wires over their own lands or premises, or over others where they can obtain way-leaves, and they should be allowed, on payment of a fair rent, to have separate wires carried over the public bearers, or to have connections with the public postal stations (on the like terms as private letter boxes) as they may find to their advantage.

Amongst other communications I have received in support of the views set forth in my paper, is one from which I cite the following common illustration of the important benefits derivable throughout the country from the proper application of the principle of administrative consolidation to the matter in question:—

"Between here and London we have to traverse two telegraph companies' lines, and of course any fault is always attributed at this end to the main company. The agent here is a house agent, and the telegraph is useless to any one telegraphing a private message about a house to be let or sold. At the last election one party had to send their messages five miles by a messenger to forward them by telegraph, thus diminishing considerably the number of messages sent. In many small places, as it is here, the post office is in a shop, but if the telegraph was added to the post office, there would be sufficient employment for a postmaster without the shop, or he might be made the collector of taxes also, and do that during the less busy hours of the day—that is in the middle of the day,—usually the best time for collecting taxes. If, then, these offices were united, and given to one competent man, the work would be done much better than it is at present, when the three offices are given to three incompetent men. The officer might be made also the assessor of property for the house and property tax, and, being a government officer, he would have no motive for divulging any of the facts, but rival tradesmen have a keen motive to do so."

I should have mentioned the frequent need of the transmission of messages over the lines of separate companies; and their repetition by different clerks as a common source of mistakes; and the conveyance of the messages by hand from one company to another as a necessary occasion of delay, as well as of extra cost.

I consider the utilisation of our 10,000 postal establishments, and of the services of our 20,000 letter-carriers and postal servants for the transmission of money-orders (which I might have mentioned as one service that might often be rendered by postal telegraph), and for the collection, care, and payment of savings, as well as for the payment of annuities, to be one of the most valuable public improvements of our time. But I must take occasion to declare that greatly as our postal service has been improved, there is yet much to do with it in the application of correct principles to keep it up with the advances made upon its own great lead in uniform penny letters in various continental States. Not only in Switzerland, but in other States, a halfpenny letter post has proved to be remunerative. In Hanover, and I believe in some other States, there is a farthing post. In Belgium our *Journal*, for which we are charged a penny, would be delivered for a halfpenny, and so with newspapers and any sheet of printed matter. The charge for the carriage of books is double what it ought to be With charges reduced (according to the principles we have contended for in this Society) parcels in Hanover are frequently as numerous as letters. In Switzerland, by the adoption of the same principles, the postal parcels have largely advanced; and by these cheap postal deliveries, which separate traders could not accomplish, the railways gain, as we said they would do, by an amount of goods traffic in bulk which otherwise they would not have. Our postal regulations for the conveyance of trade samples, at a fourfold rate of eightpence per lb., are made in a dark spirit of protectionism against parcels in general, and on a principle of exactions on necessities from which the whole service ought to be purged.

Without presenting it as the most advanced example, I adduce the following account, sent me by a relation resident at Zurich, of the present postal system,

including telegraphs and parcels, to which Switzerland owes so much of its late commercial and social progress. This account I would commend to the special attention of chambers of commerce, as a most important subject for their consideration, and to retail dealers in the country, as well as to wholesale houses in towns.—I am, &c., Edwin Chadwick.

"The largest sized parcel that can be sent by our post is 120 pounds.

"Books, if above 500 grammes (1 lb. 4 oz.) pay as parcels, according to weight or value.

"Parcels (of weight and value) are taxed in Switzerland according to the distance they have to run (the shortest post road being measured). We distinguish weight and value parcels.

"Weight parcels, up to 10 lbs., pay for every 15 English miles 2 centimes, or rather less than a farthing for every pound weight (an English shilling = 125 centimes); and to this is added a ground-tax of 10 centimes (one penny). For weight parcels above 10 lbs. the first 10 are charged as above stated, and 1 centime is added for every additional pound and distance (a distance is equal to 15 English miles).

"Value parcels up to 1,000 francs (£40) pay for every 15 miles (or 1 distance), and every 100 francs 2 centimes (less than a farthing), and to this is also added a ground tax of 10 centimes (one penny). Value parcels above 1,000 francs (£40) pay as above for the first £40, and then are added 1 centime, or half a farthing for every 100 francs (or £4) and distance (15 miles).

"The minimum of a weight or value parcel is, up to 15 miles, 1½d. (15 centimes); above 15 and up to 30 miles, 2d. (20 centimes); above 30 and up to 75 miles, 3d. (30 centimes); above 75 up to 120 miles, 4½d. (45 centimes); above 120 miles, and up to the greatest possible distance in Switzerland, 6d. (60 centimes).

"Value parcels are taxed generally according to their value, but if their weight gives a higher rate than their value, they are rated by weight.

"A parcel weighing between 1 lb. and 2 lbs., with a value of 200 francs (£8), would cost, from Zurich to Geneva, 6d. The post is answerable for the value of the parcel, which has determined the rate of postage.

"Newspapers and printed matters pay, throughout Switzerland, up to 15 grammes (not quite three-quarters of an ounce), 2 cents. (not quite a farthing); from ¾ oz. to 10 ozs., 5 cents, ½d.; from 10 ozs. to 20 ozs., 10 cents, 1d. These parcels, if above 20 ozs., pay as weight parcels.

"Letters (local rate) pay, up to six English miles, for 10 grammes (not quite half-an-ounce), ½d.; from not quite half-an-ounce to 10 ozs., 1d.

"Letters throughout Switzerland, not quite half an ounce, might pay 1d. if prepaid, 1½d. if not prepaid; from half-an-ounce to 10 ozs., 2d. if prepaid, 3d. if not prepaid.

"Our postage is cheaper and more extended than in the neighbouring countries. Our telegraph costs a franc throughout Switzerland for every twenty words; five words more cost 2½d. Baden, Wirtemberg, Bavaria, have the same telegraph tax, but their wires are not nearly so numerous as ours. I am told that Switzerland has many more telegraph lines and offices than any other country; in fact, we can telegraph to every village, and to the tops of all mountains where any hotels are. Telegraphs are so good and so cheap that everybody uses them—rich and poor—consequently they pay very well. We are now introducing telegraph stamps."

Mr. Rumbold, in his report to the Foreign Office on the Federal finances and expenditure, states that the interests of Switzerland at large have been "admirably served" by the transfer of the Continental post to the central authority under the existing system; the effects of the new postal system exceeded every expectation:—"The gross receipts of this branch of the public administration, which in 1849 only reached the sum of 4,898,327 francs, had increased in 1861 to 7,112,951 francs, and are reckoned in the budget for this year (1866) at 8,607,500 francs. According to the report of the Federal postal department for 1864 (the report for 1865 has not yet been published), the net receipts amounted to 1,503,302 francs 50 centimes, as against 758,212 francs in 1850. The number of letters increased in the same period from 15,106,117 to 34,325,916; the parcels sent by post from 2,099,368 to 4.813,264; the newspapers sent by post, from 10,601,325 to 25,026,095. I may mention here that the number of newspapers sent in 1864 exceeds, by no less than 1,562,625, that of the newspapers sent in 1863."

MEETINGS FOR THE ENSUING WEEK.

Mon.....Society of Arts, 8. Cantor Lecture. Mr. John Hullah, "On Music and Musical Instruments."
London Inst., 7. Mr. G. A. Macfarren, "On the Lyrical Drama."
R. Geographical, 8½. "Last Journey of Dr. Livingstone." Despatches from Dr. G. E. Seward and Dr. J. Kirk.
British Architects, 8.
Actuaries, 7. Mr. Peter Gray, "On the Construction of Tables by the Method of Differences." Part III.

Tues ...Medical and Chirurgical, 8½.
Civil Engineers, 8. Discussion "On Steep Gradients and Sharp Curves;" and (time permitting) Mr. W. A. Brooks, "Memoir on the River Tyne."
Ethnological, 8. 1. Professors Huxley and Busk, "On the Skulls of the Ainos, Chinese, Hottentots, Kaffers, and Burmese." 2. Mr. J. Crawfurd, "On the supposed Aborigines of India as distinguished from the Civilised Inhabitants." 3. Dr. Hyde Clarke, "On Ancient European Mines."
Royal Inst., 3. Rev. G. Henslow, "On the Practical Study of Botany."

Wed ...Society of Arts, 8. Mr. C. F. T. Young, "On Flax, and Improved Machinery for its preparation."
R Society of Literature, 8½.
Archæological Assoc., 8½.

Thur ...Royal, 8½.
Antiquaries, 8½.
Zoological, 8½.
Philosophical Club, 6.
Mathematical, 8.
Royal Inst., 3. Mr. W. Pengelly, "On Geological Evidences in Devonshire of the Antiquity of Man."

Fri .....Royal Inst., 8. Prof. Frankland, "On the Water Supply of the Metropolis."

Sat .....Chemical, 8. Annual Meeting.
Royal Inst., 3. Mr. W. Pengelly, "On Geological Evidences in Devonshire of the Antiquity of Man."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 13th March, 1867.

96. Landed Estates Court (Ireland)—Returns.
104. Bunhill-fields Burial Ground—Letter.
Public Petitions—Eighth Report.

Delivered on 14th March, 1867.

67. Bills—Criminal Lunatics (as amended).
70. ,, Sale of Land by Auction.
34. Metropolitan Board of Works—Report.
46. Trade and Navigation Accounts (corrected pages).
78. (III.) Committee of Selection—Fourth Report.
107. Education—Returns.
109. Army (Engineer Officers)—Return.
113. Army—Estimate "On Account."
114. Civil Services—Estimate "On Account."

Delivered on 15th March, 1867.

21. Railway Companies' Deposits—Returns.
27. Works and Public Buildings—Abstract Accounts.
116. Revenue, Taxation, &c.—Return.
119. Male Occupiers (Boroughs)—Return.
120. Inhabited Houses (Voters)—Returns.
Mexico—Convention.
The "Tornado"—Correspondence (Part II.).

Delivered on 16th March, 1867.

72. Bill—Inclosure.
73. (II.) Railway and Canal Bills—Third Report.
105. East India (Irrigation)—Despatches.
106. Court of Chancery—Return.
121. Parliamentary Boroughs—Return.
127. Captain J. Gordon Deslandes—Papers.
Servia—Correspondence.
Public Petitions—Ninth Report.

Delivered on 18th March, 1867.

46. (1). Trade and Navigation Accounts (31st January, 1867).
125. Merchant Seamen's Accommodation—Return.
Totnes Borough Election—Report of Commissioners.
Children's Employment Commission (1862)—Sixth Report of Commissioners.

Delivered on 19th March, 1867.

77. Bills—Masters and Workmen (Lords).
78. ,, Public Schools (Lords).
79. ,, Representation of the People.
115. Postal Service (Atlantic)—Correspondence.
117. East India (Contract Law)—Return.
131. Treasury Chest—Account.
Cape Spartel Lighthouse—Convention.

Delivered on 20th March, 1867.

18. Metropolitan Workhouses—Return.
118. Gas (Metropolis)—Correspondence.
128. Public House Closing Act (1864)—Return.
134. Greenwich Hospital Estates—Regulations.
135 Metropolitan Local Government, &c.—Reports.
Public Petitions—Tenth Report.

Patents.

From Commissioners of Patents' Journal, March 15th.

Grants of Provisional Protection.

Alphabets and reading, teaching—476—B. Mitford.
Answers to selected questions, instruments for giving—435—J. Parkes.
Axle-shafts and axle-boxes—582—J. G. Stidder and R. Morris.
Beacons - 312—Earl of Caithness.
Boot and shoe toe-pieces—416—D. Tenniswood.
Bottle-stopper and key, a self-closing—382—P. D. Collins.
Breech-loading fire-arms and ordnance—468—J. Bishop.
Brushes—508—C. Turner.
Buildings, floors and roofs of—452—H. Y. D. Scott.
Buttons—384—R. T. Thompson.
Candlesticks—521—H. R. Du Pré.
Carbonate of soda and of potash—494—C. Kessler.
Carding engines—390—J. B. Booth.
Carding engines, feeding—428—J. Ferrabee.
Cartridges, central fire—519—J. Syme.
Casks, cleansing—496—T. King.
Chain beaming apparatus—420—J. P. Kerr and W. McGee.
Chairs—501—C. G. Gumpel.
Chimnies, preventing down draught in—444—C. Wenner.
Cricket spikes—490—J. Wareing.
Dining-tables—434—H. Cooper.
Engines, &c., transferring—386—J. Ramsbottom.
Envelopes—524—E. Hely.
Envelopes, &c., securing—491—C. M. Tate.
Fats, &c., boiling—515—W. Barratt.
Fibrous materials, preparing—529—J. Tatham.
Fibrous materials, scutching, &c.—450—E. Brasier.
Fibrous substances, drawing—426—J. Combe.
Fire-arms—326—J. Box.
Fire-arms, breech-loading—392—J. H. Johnson.
Fire-arms, breech-loading—460—A. Albini and F. A. Braendlin.
Fire-arms, breech-loading—480—J. F. Bland.
Fire-arms, breech-loading—504—I. M. Milbank.
Fire-escapes, portable—572—R. A. Jones and J. C. Hedges.
Fire-places—590—E. Thring.
Foot-rot in sheep, curing—564—M. Woolrich.
Friction matches, packing—414—J. V. Toepken.
Furnaces—354—H. E. Falk.
Furnaces - 517—J. A. and J. Hopkinson, jun.
Furnaces—578—B. Sheard.
Gas engines—499—A. Kinder and W. B. Kinsey.
Hammers - 440—R. Thwaites, E. H. Carbutt, and J. Sturgeon.
Hard materials, breaking—456 T. Archer, jun.
Iron safes—400—J. Westwood and R. Baillie.
Lamps—404—H. Houfe.
Lamps—406—W. Jones.
Lamps—525—G. Young.
Lasts—526—J. L. Sharman.
Liquids, drawing off—424—P. Duchamp.
Liquids, extracting—531—C. E. Brooman.
Meat, preserving—378—E. Gorges.
Metallic alloys—505—P. A. Muntz.
Metal plates, punching—438—R. Hodson.
Meters—109—J. Colvill.
Motive engines, regulators for—580—F. A. P. Vandeputte.
Motive power—472—E. G. Brewer.
Motive power—486—C. Colwell.
Motive-power engines—422 R. Shaw.
Motive-power engines—474—J. Weems and T. Robertson.
Motive-power engines—498—H. Purnell.
Mowing and reaping—588—G. M. Garrard.
Oxygen, producing—568—W. Clark.
Patent leather, &c.—446—A. A. Fousset.
Peat, treating—512—E. Chapron.
Pen-boxes, &c.—374—F. Leonardi.
Phosphatic minerals, preparing—47—W. Way.
Photographic pictures—20—W. G. Helsby.
Pictures, exhibiting—380—A. G. Grant.
Portfolios, &c.—510—G. Lüttringhaus.
Pump-rods, counterbalancing—485—W. West and J. Darlington.
Rag engines—482—J. R. Crompton.
Railways, an alarum for the use of—523—E. Funnell.
Railways, rails for—506—B. Billingham, A. Griffiths, and J. Dudley.
Railways, signalling on—518—G. Daws.
Railway trains, electric signals on—488—A. I. L. Gordon.
Salts of ammonia—358—W. S. Losh.
Saw frames—478—J. Robinson and J. Smith.
Sewing machines—396—A. V. Newton.
Ships, removing sea-weed, &c., from—484—J. Harrison.
Smooth surfaces, polishing—462—R. Kunstmann.
Soap—492—W. Clark.
Spinning, &c., steel caps—500—W. Deakin and J. B. Johnson.
Stays, &c.—408—S. Osborne.
Stays, &c., a new fabric for—592—A. C. Laurys.
Steam boilers—276—W. and D. Fisken.
Steam boilers—376—R. James.
Steam boilers—516—J. Alison.
Steam boilers, &c., fluid safety guages for—511—J. Marshall.
Steam engines—527—C. Martin.
Steam engines, condensing—536—J. Wild, jun.
Steam engines, regulating—448—A. Beniest.
Steam generators—402—W. E. Gedge.
Steam toys—2901—C. Sutton.
Substances, grinding—566—J. Bellerby, jun.
Tallow cups—507—J. Bates.
Tentering machines—398—W. Clissold.
Textile fabrics, &c., sewing—574—J. H. Johnson.
Threads, preparing—509—C. E. Brooman.
Ticket-holders—412—H. A. Dufrené.
Trap doors, &c, securing—436—E. Stevens.
Vehicles—388—W. Stratford.
Vehicles, wheels for—470—G. Haseltine.
Veneers, cutting—570—A. V. Newton.
Vessels, raising—441—A. Dillon.
Weaving, looms for—430—E. Lord.
Windlasses—442—W. H. Harfield.
Windows, &c., securing - 432—J. Carter.

Inventions with Complete Specifications Filed.

Bath belts—699—M. J. E. Jullienne.
Leather, hardening, &c.—651—W. H. Towers.
Needle cases—669—J. E. Asselin.
Pianofortes—623 - W. E. Gedge.
Scissors or shears—649—B. Snow, jun.
Solutions, preserving—684—H. A. Bonneville.
Steam boilers, feed-water regulators for—614—G. Haseltine.
Steam engines, &c., packing for—613—G. Haseltine.

Patents Sealed.

2385. J. Dodge.
2386. J. H. Johnson.
2395. T. Parkes.
2397. J. H. Sams.
2399. A. S. Stocker.
2401. F. Sage.
2408. T. Dixon.
2410. G. and E. Ashworth.
2415. A. B. Bérard.
2424. G. Stuart.
2458. H. Turner.
2480. H. A. Bonneville.
2481. H. A. Bonneville.
2482. H. A. Bonneville.
2483. H. A. Bonneville.
2497. H. E. Gilles.
2499. T. W. Bunning.
2517. H. A. Bonneville.
2593. G. T. Bousfield.
2726. A. V. Newton.
2903. A. V. Newton.
2916. C. D. Norton.
2980. H. A. Bonneville.
3183. T. Wilson.
30. E. N. Gregory.

From Commissioners of Patents' Journal, March 19th.

Patents Sealed.

2413. C. W. Siemens.
2419. G. O. Gooday.
2433. G. Dyson.
2434. J. M. Heppel.
2437. G. Thring.
2439. J. G. C. Fussell and W. Wise, jun.
2441. T. Brace and W. Savory.
2446. W. Weichert.
2450. A. F. Stoddard.
2462. J. Lawson and E. G. Fitton.
2485. J. H. Johnson.
2501. J. A. Chaufourier.
2507. W. Ryan and W. Edgar.
2508. J. S. Johnstone.
2514. W. Clark.
2533. J. Oetzmann.
2591. W. E. Newton.
2705. E. W. Uren.
2767. G. F. L. Meakin.
2780. G. Davies.
3260. J. Varley.
3338. M. H. Simpson.
3452. G. T. Bousfield.
63. A. V. Newton.
93. W. E. Newton.

Patents on which the Stamp Duty of £50 has been Paid.

634. J. Platt and W. Richardson.
731. A. Morel.
642. H. Eastwood & B. Matthews.
677. J. Dauglish.
644. S. Holmes.
652. T. Chamberlain.
717. J. McMorran.
662. J. Rowell.
664. B. Day.
685. J. Bleasdale.
690. L. A. Durrieu.

Patent on which the Stamp Duty of £100 has been Paid.

527. T. Silver and J. Hamilton.
680. I. Horton and I. Kendrick.
707. E. &W. Cope, &W. G. Ward.
719. J. H. Heal.
778. J. A. Maxwell.
699. W. Weild.
702. W. Wood.

Journal of the Society of Arts.

FRIDAY, MARCH 29, 1867.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'Clock:—

April 3.—The following subject for discussion will be introduced by Thos. Hawksley, Esq., M.D. Lond.:—"How to provide Healthy and Cheap Dwellings for the Working Classes with Financial Success."

Cantor Lectures.

A Course of Lectures "On Music and Musical Instruments," by John Hullah, Esq., is now being delivered as follows:—

Lecture V.—Monday, April 1.

Musical Instruments.—Classification—Wind Instruments—Stringed Instruments—The Plectrum, Hammer, and Bow—Instruments of the Ancients—Mediæval Instruments; their Introduction into the Church.

Lecture VI.—Monday, April 8.

Musical Instruments (*continued*).—Modern Instruments—Chamber and Orchestral—Combination—The Modern Orchestra—Conclusion.

The lectures commence each evening at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend to each lecture.

Subscriptions.

The Christmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Food Committee.

The Sub-Committee on Meat met on Friday, the 15th instant. Present—Mr. Harry Chester, in the Chair; Messrs. C. S. Read, M.P., C. Wren Hoskyns, F. Parish, E. Wilson, J. Ware, and J. Ludford White.

Mr. Tindal, of Clarence River, New South Wales, attended, and in reply to questions from the Chairman and other members of the committee, stated that he was one of a private company of twelve, who had embarked capital in a meat-preserving establishment at the Clarence river, where he resides. The Company kill a large number of cattle annually, and are now sending over the meat preserved in a cooked state in tins, after the well-known process which has been so long in use. Consignments are made to Messrs. M'Call and Co., in this country. The Company had already sent two consignments of about 60,000lbs. and had made arrangements for sending that amount monthly. This is sold in six pound tins, at 7d. per lb. retail for the best parts, and 6d½. per lb. for the inferior parts. It has hitherto been sold principally for shipping purposes. The cattle are in the best condition for killing in the months of April and May. They can kill 10,000 head annually. Mr. Tindal considers that an Australian bullock furnishes more and better meat than a South American bullock. Only the meat is preserved, and the bones are dealt with in other ways. The shank bones are worth from £10 to £15 a ton, and are sent to England; the other bones are ground and used for manure. The ground bones would not pay to send to England, the freight is too high. In reply to questions in reference to this sending of meat to England, Mr. Tindal stated that the process was equally applicable for mutton, but that it would not pay so well commercially to send over mutton. In the first place, the mutton was dearer than beef—the wethers are kept longer before coming to maturity than bullocks—the former being kept seven years, whilst the latter is fit to be killed in four years. Again, as the bones have to be taken out, there is as much labour in taking out the bone of a sheep as of an ox, or nearly so, and the proportionate amount of meat is much larger in the one case than the other. It therefore does not pay so well to send mutton as beef. The cattle in Australia are originally of English breed, and by the purchase of English prize bulls the breed has been brought to a high degree of perfection. Mr. Tindal's company make and export the *Extractum carnis*. The sale is greatly increasing. The company has in their pay a scientific chemist, under whose superintendence the company's business is conducted. The *Extractum carnis* cannot be made profitably from veal, or, indeed, from any young meat; veal meat is very deficient in the materials which form the *Extractum carnis*.

Mr. McCall, of the firm McCall and Co., Houndsditch, provision merchants, stated, in reply to questions from the committee, that the trade in Australian preserved beef was quite new, and at present the sale was confined to the shipping trade; indeed the article was unknown in the home trade, but it was his intention to place it before the public generally through the ordinary retail channels, and, until this was carried out, his firm were willing to supply a single tin at the above-named prices. Some persons objected to the meat being cooked, and they were now experimenting with a view of bringing in preserved uncooked meat; but, although these experiments were promising, they had not hitherto succeeded in obtaining such a measure of public support as would enable them to embark in that enterprise. With regard to turtle, he stated that the turtle were killed in Jamaica; the calipash and calipee, or lining of the shell, is dried, packed in tin-lined boxes and sent over to this country. The turtle flesh is not sent over. This dried calipash and calipee, when required for use, is soaked for several days, and made into soup with veal stock. The main supply of turtle soup is thus made. Live turtle, no doubt, are sent over here, but a very large number of them are only fit to be killed immediately on their landing, and their calipash and calipee is dried for preservation until wanted for use. Messrs. McCall preserve large quantities of English meat in the same way as that in which the Australian meat is preserved. The bones form 25 per cent. of the carcase; thus a 6lb. tin of meat represents 8lbs. of butchers' meat. He further stated that the heavy beef preserved in this manner at the Deptford Victualling yard must cost the government 11½d. per lb. He could offer Mr. Tindal's Australian beef at 7d. per lb., with a discount of course on the sale of a large quantity.

Lord De L'Isle laid before the Sub-committee on Milk, at one of their Meetings, the following remarks on—

The System of Cow-keeping as Practised in the North of England, as Regards the Supply of Milk to the Labouring Classes. By Mr. Sturgess.

The system of cow-keeping practised by a portion of the agricultural labouring class living in the agricultural villages in the north of England is of old growth, and has now become, to a certain extent, an institution of the district. There can be no doubt in the minds of those who have seen it in operation, that it has tended to the improvement of the position of the industrious and painstaking labourer, enhanced in a material degree his home comforts, given him an interest in the locality, and bound him with a tie of no ordinary character to the occupation he holds; further, it has been the means of retaining in districts many steady, good workmen, who have been of essential service to the farmer located with him in the same parish. This system of cow-keeping, I think, may be considered an elder member of the garden allotment system, for the aim of the latter was, no doubt, to advance further, but in another form, the principle of getting the labourer to settle down, by attaching to his cottage a small plot of garden ground, wherein he could occupy the leisure-hours of himself and children, and thus add to his means for procuring more comforts for his family. Before giving particulars of the system, it would be well first to mention that it necessarily involves some additional expenses to be incurred by the owner, in providing the needful accommodation for cow-keeping, and sub-dividing the land with quick fences or post and rails into small and convenient-shaped holdings; and although this expense at first sight may appear heavy, yet I do not doubt that, with the increased rent generally obtained for the cottage and land over what is paid by the neighbouring tenant-farmer for similar land, the cottager pays interest, in the shape of rent, for the additional accommodation that has to be provided for him under this system. The additional accommodation may be stated simply to consist of a small additional space being required in the cottage for a dairy, say about 8 feet long by about 6 feet wide. The cow-house should be about 12 feet long and 8 feet wide; this would give room for one cow and a calf, or, if the latter was not kept, two cows might be accommodated. The pig-stye cannot be called an addition, it being generally attached to all cottages in agricultural villages. The extra cost, therefore, for dairy-room in house, with cowhouse, would not be more, I estimate, than from £20 to £25, in fact, in many places, the accommodation required is put up at a very trifling expense.

I now beg to add the following particulars in regard to the extent of land occupied with cottages under this system, the amounts of rent paid, with a description of the class of labourer holding those tenancies in the north, and which, I must observe, more particularly refers to the North Riding of Yorkshire:—

Description of Labourer.	Land occupied. A.	R.	P.	Rent paid for Land and Cottage. £	s.	d.
1. Worked in a brewery....	1	0	36	10	10	0
2. General farm labourer ..	5	2	15	16	15	0
3. Ditto ditto ..	2	1	22	15	10	0
4. Bricklayer	3	3	13	14	2	0
5. General farm labourer ..	1	1	14	6	12	0
6. Ditto ditto ..	1	3	22	10	6	0

The houses attached to the above occupations are good, and where the land held exceeded two acres, the tenants had increased accommodation for additional stock keeping. I may also add that, in connection with the above tenancies, the tenants had the opportunity of "gating" out his cow during summer in a gentleman's park adjoining the village, thus giving him an opportunity of cutting his own grass for hay. The cost, I may note, for pasturing a cow from May-day to Michaelmas (20 weeks) varies from 60s. to 80s., according to size of animal.

Particulars of certain Occupations continued, but taken from another part of Riding.

Description of Labourer.	Land occupied. A.	R.	P.	Rent paid for Land and Cottage. £	s.	d.
1. General farm labourer ..	10	1	21	13	10	0
2. Worked on the public roads.....	5	0	2	10	19	0
3. Gentleman's servant....	5	0	27	12	10	0
4. Village blacksmith	4	2	34	14	14	0
5. „ carpenter	6	1	33	21	0	0
6. General farm labourer ..				8	5	0
7. Ditto ditto ..	8	2	19 pasture	8	5	0
8. Ditto ditto ..	5	2	0 meadow	8	5	0
9. Ditto ditto ..				8	5	0

The four last occupations had a pasture field allotted among them, containing 8a. 2r. 19p., so they all grazed an equal number of cows in it. The meadow field, 5a. 2r. 0p., was divided by stakes into four portions, so that each knew his own meadow piece for cutting. The first five occupations in the above list had sufficient ground for keeping two or more cows both winter and summer.

Particulars continued, but taken from a different part of the Riding.

Description of Labourer.	Land occupied. A.	R.	P.	Rent paid for Land and Cottage. £	s.	d.
1. Village carpenter	4	0	39	12	0	0
2. General farm labourer ..	1	2	22	6	0	6
3. Ditto ditto ..	6	2	18	9	12	0
4. Ditto ditto ..	4	3	34	8	0	0
5. Ditto ditto ..	4	2	0	8	0	0
6. Village schoolmaster	3	3	3	7	10	0
7. „ smith	5	0	28	13	14	0
8. General farm labourer ..	3	0	22	9	10	0
9. Village shoemaker	5	0	9	10	0	0

In some of those last-named occupations, where the quantity of land was not sufficient for pasturing a cow during summer, and reserving a portion to cut for hay, the cottager either got a grant to run his cow in the lanes, or, if that was not obtained, he generally got pasturage with a neighbouring tenant-farmer.

In reference to the disposal of the produce of the cow, it may be stated that, as a general rule, it is made into butter, for which in the district there is a steady and regular demand, arising principally from the increase of large manufacturing towns in the Riding. It is, however, not to be understood that no milk from the cow is sold; on the contrary, where any labourer in a village is without a cow he can have a good supply at 1d. per pint. Under those circumstances there is no lack to those desirous of obtaining it. Of the skim milk which is left after the cream is taken off, part is used by the family, and part is sold, the remainder going to help the feeding of one or two pigs.

From a personal knowledge of the system, extending over more than 20 years, I can speak to its beneficial effect in promoting industry, giving greater comfort and many additional luxuries to the labouring man's family, and also as having been the means of promoting socially his own and children's advancement. In many instances I have known that it has helped the labouring man to place one or two of his sons in a useful trade; and as regards the female portion, it has helped, by the duties incident to their position while at home, to prepare them for making useful servants to the farmers and others resident in the district. In respect to any difficulty in obtaining tenants for those small occupations, I can only add, that on a vacancy occurring it is eagerly inquired after, and soon a choice of tenants offers; further, as to punctual discharge half-yearly of the rents, it is satisfactory to state that an arrear rarely, if ever, occurs; I have never known one.

The success which, as shown by the foregoing remarks, attends the cow-keeping system, has only

been attained by the length of time it has been in operation, as it must be evident to every one who has made inquiry into its working, that a great deal depends upon the management and skill which the labourer's wife can bring to bear to the occupation, it being left principally in her hands to manage; otherwise without that skill it could not be expected to succeed. It may also be noticed that the system under consideration is now so far recognised as to the advantages which it has conferred, that there is a regular prize now offered by the local agricultural associations for the best cottager's cow; and in this class at those local gatherings cows of excellent quality are exhibited. The cow clubs are also numerous among them, where, by a small annual payment, the loss of a cow is provided against.

In making a few concluding remarks as to how this cow-keeping system could be applied to the south, I may note, first, as regards the land, that I think the grass lands of the north are better, as well as the herbage; they are also, in the neighbourhood of the villages, divided into small fields, suitable for this class of occupation. I have not found this so in some of the districts south of London. This, however, in itself, need not be a fatal objection to a trial of the system, if other circumstances were favourable. Of course, in the chalky districts, where the grass lands are very poor, the system could not be introduced with any fair prospect of success, for owing to the quantity of artificial food which would have to be purchased to assist to keep a cow in condition on this description of land, the expense of this artificial food would deprive the system of the advantages it is presumed to confer.

Taking, however, the other districts of the south, where the grass land is of fair quality, and where facilities would be given for dividing a few grass fields into suitable occupations for the keep of a cow, there is the practical difficulty yet to be got over, that neither the labourer nor his wife, especially the latter, is qualified by previous experience to undertake the management of cows; further, it is not a system that can be taken up at once, although funds may not be wanting for providing the cows, &c. It is upon the experience of the housewife that so much depends to make the occupation of advantage, aided no doubt by the co-operation and assistance which she receives from her children, who are early instructed in those duties. In my experience of the south, I should say that it is next to impossible to find a female, wife or servant, that can milk, let alone knowing anything about butter-making and other duties attending the successful working of the system. Further, it is far from general that the labouring man knows anything about cows, or is able to milk one, and, therefore, however well the system may be shown to answer in the north, it would not follow, from the circumstances before noted, that if tried it might be equally successful in the south.

The economy of living and the food consumed by the labouring class in the south are very different to the custom in this respect in the north; in the latter more animal food being taken and more milk used, whereas in the former meat does not enter into consumption except to a limited extent, and, in the place of milk, beer or cider is the substitute. The use of the two latter as a part of the domestic economy of the labouring man's household, is, I am afraid, a great inducement to his visiting and being found often at the beer house.

If the system could by any means be introduced, there is no doubt that much good might be derived from it, not only in elevating the position and character of the labouring class, adding greatly to his home comforts, but also further (which I should myself put some stress upon), in the duties which would necessarily be thrown upon the family; these would tend to qualify them for making good and creditable servants, who would thus be more conversant with the duties required of them in many situations they might be called upon to take.

These few suggestions have occurred to me in the consideration of this subject; no doubt more detail could be entered into if space was available, but I trust the little I have adduced in reference to this matter may be of service in helping to bring into notice a branch of cottage economy which I believe has been and is now doing good service in the north of England.

In reference to the foregoing memorandum, Lord De L'Isle writes:—

The above able and comprehensive remarks of Mr Sturgess, so thoroughly explain the subject, that comment on my part is almost unnecessary.

I would simply observe that the system of cow-keeping in the north of England is one of long standing, the growth of years, and it has tended much to the comfort of the labouring class. Whether such a system could be established, in suitable districts in the south, with fair prospect of success, is a question which requires some consideration.

The principle of allotments has answered well in certain places, in others it has not met with the same amount of success.

The habits of the labourers in the north differ much from those of the south, and in the management of a dairy much depends on the skill, cleanliness, and industry of the wife.

In the north most of the labouring-classes are well acquainted with the management of dairy-stock, but this is not the case in most parts of the south of England, where great difficulty exists in finding either a man or a woman who can even milk properly.

These are some of the difficulties which would attend the introduction of this system; but I cannot help thinking that, from the success it meets with in the north, it is well worthy the attention of landlords, as a means of giving to the labourer a more permanent interest in the soil, and by his own industry and good management adding many comforts to his home. It would also enable him to sell milk in small quantities to those of his own class who now frequently experience great difficulty in obtaining even a limited supply.

Cantor Lectures.

"On Music and Musical Instruments." By John Hullah, Esq.

Lecture IV.—Monday, March 25.

Musical Notation.

Having described the four properties of musical sound—duration, pitch, intensity, and timbre—Mr. Hullah said that the first two of these were incomparably the most important. Duration and pitch (time and tune) are not so much essentials of music as music itself. Without time musical sounds want form; without tune they want life. An efficient musical alphabet must be competent to represent, or convey accurately, duration and pitch. In this respect the alphabet of music will differ from all others; since, with a few partial exceptions, no other attempts to represent anything but sound, and that in a very unprecise manner. Two systems of musical notation have long existed—the one alphabetical, the other express or especial. The former is much the more ancient, the latter has proved incomparably the more convenient. No monuments are extant of the musical notation of the Assyrians, Egyptians, or Hebrews. The Hebrew accents now in use are comparatively modern, but it is believed that something like them was in use in earlier times; and accents, if not exactly numerical notes, are akin to them. Musical notations, borrowed from existing alphabets, have long been used in the East. In these the letters were modified to express duration. This was effected by accessory signs. The notation of the Greeks (also alphabetical) was originally very simple, but in later times it became complex, through the increased number of modes, a separate notation for instruments, and generally a more ornate style of music. The Romans,

always imitating the Greeks in art, used the first fifteen letters of their own alphabet for numerical notes. Special musical notation began with the early middle ages. The public libraries of Europe abound with MSS. of the 8th, 9th, 10th, 11th, and 12th centuries, noted in characters not belonging to any known alphabet. These are of two kinds; one formed of little marks, varying in position, each representing an individual sound; the other of lines fantastically bound together, representing groups of sounds. To these two kinds of musical notation may be traced our own—of the perfection and fitness of which he proposed to speak presently. From the detached signs come the long-breve and semi-breve; and from the contorted lines come our groups of quavers, semi-quavers, &c. This ancient notation is known among musical antiquaries as *neuma* notation—a name first given to it by Du Cange. The derivation of modern notes from neumas is not difficult to trace; but the origin of the latter has been a subject of much controversy. Mr. Hullah then gave an account of the theories on the subject, of Theodore Nisard, Kiesewetter, Fetis, and De Coussemaker, giving the preference to that of the latter, who derives neuma, and therefore our present, notation from the three accents of speech—the acute, grave, and circumflex. The first difficulty in respect to this theory lies in our inexact use of the word *accent*, which was generally confounded with emphasis or stress, a part, but not the whole of accent. Ben Johnson calls accent the "tune of speech," a definition in accordance with the derivation of the word. Admitting that accent is something more that emphasis, there is nothing unreasonable in the supposition that characters adopted for the purpose of bringing to mind the tune of speech should have been adopted and improved for fixing the more strictly musical tune of song. From the eighth to the twelfth centuries, during which neuma notation was used throughout Western Europe, it underwent many modifications, the general result of which was its eventual transformation into the square notation still in use for plain song. In the earliest extant specimens of neuma notation may be traced indications of the fundamental principle of modern notation, the expression of relative pitch by relative position. But this expression was for a long time very inexact. Notes were frequently misplaced; and even in their proper places they were often difficult of comparison. The idea presented itself to some acute mind, of drawing a horizontal line, the pitch of which, once agreed upon, would determine that of the notes immediately about it. "Il n'est que le premier pas qui coûte," in arts as in morals. Improvement on this contrivance was easy, all but inevitable. If one line contributed to accuracy, two would be better still; and for some time two lines, distinguished by different coloured inks, were used, an initial letter on each, indicating the notes standing upon it. These were the first clefs. Subsequently a line was inserted between these two; and subsequently again the number of lines was increased to four; this number being in later times greatly increased, and ultimately reduced to the present number, five. The adoption of the stave, by making the places of the notes more easily recognised, soon induced greater accuracy in their forms, certain varieties of which, at very early periods, no doubt indicated different lengths. Like the history of the stave, that of "Time table" might form the subject of many lectures. The very simple proportions of notes to which we are used are the result of ages of experiment. From the end of the 12th century to the end of the 16th, the most extravagant complex means were in use to express even the simplest rhythmical relations; and many rhythmical relations were often anything but simple. Even after much of this intricacy was cleared up, music—even easy music—must have been very hard to read. Till about the beginning of the 17th century music was commonly written and printed without bars. The bar was no doubt used as early as the 11th century, but not to divide notes into measures, but into phrases; in no way answering the purpose of our bar, which, besides dividing notes into equal quantities, incidentally shows to what notes the principal emphases are due. Our word *score* has grown out of the act of drawing bars down the superposed parts of a composition—in fact *scoring* the page. Mr. Hullah then traced the gradual multiplication of the number of forms of notes in recent times, and the modifications to which these had been subjected, not merely in form, but even in colour; and he showed by what simple contrivances, such as the dot and the triplet, the more intricate contrivances of old notations had been replaced. Musical notation had now reached as high a pitch of perfection as could be expected of any human invention. It was understood and accepted too by all who practice the kind of music which it seeks to express—the whole civilized world. This is as it should be. The only universal language possesses the only universal alphabet, and it might have been expected that all who speak the one would unhesitatingly adopt the other. The fact that a symphony, or part-song, composed by a native of France or Germany, can be played or sung by an English orchestra, or a Russian chorus, without chance of any serious misunderstanding, on the part of the latter, of the intention of the former, might be supposed a good *à priori* argument in favour of a means of communion between persons so distant and in many ways so unsympathetic. The fact, too, that to this means of communion men of all nations had contributed something, and that its settlement had taken at least a thousand years, ought to weigh a little with any body who knew how hard it is to get even half a dozen people to settle or agree upon anything. There are continually springing up, however, advocates of new systems of musicography the adoption of which would reduce all our musical heir-looms to the level of waste paper, and most existing musical science and skill to the level of those of these advocates; for it is remarkable that no scheme for the reformation of musicography has ever been proposed by any person of acknowledged musical science or skill. Mr. Hullah then proceeded to pass in review the principal objections to our present musicography—that it occupies much space; that it is laborious to write; and, above all, that it is difficult to read. That many musical compositions occupy much space is not to be denied; but whether they occupy space disproportionate to the wealth of thought contained in them; to the occupation they give to those who have to interpret them; to the sensations, delightful and elevating, which they cause in those who listen to them, are quite other questions. The second objection, that music is extravagantly laborious to write, could only be seriously entertained by people who have never set foot in a great musical library, or opened a great musical catalogue. To the beginner in musical penmanship the art may appear to admit of very slow practice; but experience shows that a fair amount of exercise in it gives a most dangerous facility of expression,—too often turned to account by those who have nothing to express. Mr. Hullah proceeded then to deal with the objection that the present mode of writing music gives unnecessary trouble to those who have to perform it. This he did chiefly by reference to the most elaborate form of music—the full score, wherein was shown the superiority of a pictorial form of expression, such as modern musicians use, to a mere symbolical form, like any of those used in the mathematical sciences. In reference to the reading of a score, he said that if our present mode of writing music were as complex, as illogical, and as clumsy as its adversaries pretended, the reading of a full score must be the most stupendous operation ever achieved by the human intellect. Putting aside, however, all considerations merely musical, and confining himself to the humblest, though not the least interesting of operations—teaching the elements of singing to young children, he said that the would-be reformers of the stave confounded two very different things—the cultivation of the eye and that of the ear; or else took it

for granted that the former was by far the most difficult operation. So far from this being the case, Mr. Hullah's experience had convinced him that the cultivation of the eye was incomparably more easy than that of the ear; and that a very small part, if any, of the difficulties of teaching singing have any connection whatever with the way in which music ever has been, or ever can be, written. It had been taken for granted that the difficulties inherent to the knowledge of sound arose from the difficulties (whether fancied or real does not matter) connected with the use of the symbols which stand for sound. So far from this being the case, they have nothing whatever to do with them. Any person—any child of common intelligence — can be taught in a few minutes that such a note is four positions or "a fourth" from another; but to teach him to utter at will, or recognise when uttered, a sound a fourth above any given sound (written or not written) is a process that requires, and always will require, a good deal of skill on the part of the teacher, and a good deal of time and application on that of the learner. The lecture was illustrated by a large number of diagrams—examples of ancient and modern notation.

Sixteenth Ordinary Meeting.

Wednesday, March 27th, 1867; Peter Graham, Esq., Member of the Council in the Chair.

The following candidates were proposed for election as members of the Society:—

Cassels, Andrew, Manchester.
Eadie, Robert, Blaydon-on-Tyne.
Mendel, Sam, Manchester.
Pagan, John T., J.P., Oak Lodge, Guildford.
Rydon, Horace James, Pyrland House, Highbury Newpark, N.
Tolhurst, John, 152, Tooley-street, E.C.

The following candidates were balloted for, and duly elected members of the Society:—

De Vere, Albert, 86, St. James's-street, S.W.
Ellis, E. S., The Newarke, Leicester.
Elwes, V. Cary, Billing-hall, Northampton.
Kirkbank, John, 10, Gray's-inn-square, W.C.
Knowles, John, 42, Moorgate-street, E.C.
Pearse, Joseph Salter, 18, Barnsbury-street, N.
Potter, Edward, Marine-house, Tynemouth.
White, Henry Hopley, Q.C., the Firs, Rectory-grove, Clapham, S.

The Paper read was—

FLAX, AND IMPROVED MACHINERY FOR ITS PREPARATION.

By Chas. F. T. Young, C. E., Mem. Soc. Engineers, Assoc. I.N.A.

Although the especial object of this paper is to treat of the preparation of flax by machinery, it may not be irrelevant to preface it by some observations on the plant itself; and more particularly on the immense importance, in a commercial and national point of view, of encouraging its growth in this country; inasmuch as it might be considered superfluous to speak of the machinery best adapted to its treatment, unless we could previously show that flax itself is much needed, and that it can be very profitably cultivated.

We need not search further than our Bibles for evidence of its general cultivation by the ancient Egyptians and the Israelites; and as it appears that, amongst the latter, the chief portion of the vestments of their High Priest were comprised of fine linen, it is pretty clear that this manufacture of linen from the flax plant had then long existed, and had probably attained to a high degree of excellence, even in those very early days. Nor have we yet discovered any material so admirably adapted, in its purity, freshness, and durability, to the comfort and salubrity of the wearer, more especially in warm climates. Its general estimation naturally caused its cultivation to spread through the world as population and civilization increased, for which the nature of the plant afforded great facilities, accommodating itself, as it does, to almost all climates, although exhibiting, in regard to its fibre-producing properties, a marked preference for the more temperate and humid regions. Hence all the countries of Europe have produced this plant, and there is scarcely one in which it may not be found at the present day. In an early stage of our own country's history we find it to have been almost universally grown. Even yet there are those living who recollect that the flax or hemp croft used to be a component part of almost every homestead; the term of "hempland," still attaching to a certain plot of the farm in some counties, being nearly all that is now left to record the fact.

The importation of cotton into England, in the latter part of the last century, produced a complete revolution in this branch of what might then have been called domestic commerce. With this, gradually, or rather, rapidly, came the wonderful inventions of, and continual improvements in, machinery consequent upon the application of steam power. This necessarily led to the concentration of large manufacturing establishments in those localities which the presence of coal, iron, &c., rendered most suitable for such operations. Cotton, which reaches this country in a condition ready for the spinner's use, had manifestly many advantages over flax, which required much previous manipulation; and the struggles of the latter for a precarious existence, in its simple mode of manufacture, became daily weaker, until at length the primitive spinning wheel—whose cheerful whirr, even within some of our own recollections, was often heard at the cottage-door, supplying a frequent subject for the poet's song and the artist's pencil, and whose gyrations furnished for so many centuries a light and pleasant occupation during the winter evenings to the female inmates of the farm-house, contributing in no trifling degree to the more comfortable support of the family—came to be for ever withdrawn, and the spinning of flax, transferred, at last, from the cottage to the factory, is now carried on almost exclusively in a few of the large towns, such as Leeds, Belfast, Dundee, Manchester, &c. In Ireland, indeed, the struggle has lasted longer, inasmuch as the introduction of cotton manufactures has been by no means so rapid or so successful there as on this side the Channel, and the hand-spinning and weaving of flax has had a somewhat longer existence, but the recent introduction of the power loom for linen weaving can scarcely fail ere long to extinguish the last remnant of the primitive mode of manufacture, and to concentrate the almost entire trade in the neighbourhood of populous towns.

But, although the overwhelming monopoly of cotton has thus conduced, during the present century, to so extraordinary a change in the character of the flax trade, and tended to diminish the consumption of linen, it has by no means annihilated it, while the recent lamentable disruption in the American states, whereby the supply of their valuable cotton has been so enormously diminished, has given a considerable and probably a permanent impulse to our linen manufacture.

Both the spinning and weaving of flax has been carried to much greater perfection of late years by improved machinery; and, if the production of linen goods has not increased so much as might have been expected, the cause is to be traced rather to the deficient supply of the raw material than to the want of demand for the manufactured article.

The cultivation of flax, then, has, for this and many other reasons, strong claims on our consideration. Nevertheless, we continue to allow ourselves to be dependent upon foreign importations for upwards of one-

half of our supply, receiving annually from 60 to 80,000 tons of flax, chiefly from the northern ports of Europe, which could be as well or better grown in our own country, and for this supply we are, of course, dependent upon the continuance of our friendly relations with Russia and Prussia, any disturbance of which would place our flax spinners in the same disastrous position as that recently occupied by our cotton manufacturers.

Surely, then, there is reason in the wish that a better supply of flax could be provided for our spinners from the lands of our own country, and in the idea that the present is a desirable moment for the consideration of so truly national and important a subject; for, though the energy of the American planters is great, it can hardly be expected that, for many years to come, the Southern States can sufficiently recover from the fearful shock they have received, to be able to supply us with anything like the quantity of cotton we received from them previous to their civil war; or that we shall be able to procure it, of that peculiarly useful quality, from other parts of the world; the value of linen, therefore, as a necessary article of household use, must, in all probability, continue to be permanently enhanced.

Let it not, however, be supposed that the importance of this subject arises from the circumstance of the diminished supply of cotton. The scarcity of flax, and the great want of it by the spinners, were acknowledged facts long before the commencement of the American outbreak. Frequent meetings had been held, associations formed, and Government appealed to, with a view to encourage the growth of the flax plant—for fibre—in India, without, however, any successful result; for, indeed, neither in India nor in the American states, nor Canada—where also the subject was brought forward—have they climates half so well adapted as our own to the growth of this plant, so far as fibre is concerned, although, as regards seed it is successfully and extensively produced in India and other places. Still, it must be admitted that the results of the American war have given increased stimulus to the trade, and clothed the subject with additional interest.

In attempting to enumerate some of the advantages of flax cultivation, it may be observed that one very interesting and encouraging feature is, that it forms a strong connecting link between our agricultural and manufacturing interests. This advantage it, indeed, shares with wool, and at least equally deserves the national patronage and support, for what commerce can be so generally desirable for us as that which provides profitable employment both for our farmers and our manufacturers — draws them together by bonds of mutual interest — increases our national capital, and circulates it at home among our own people? We at present send abroad some six millions sterling every year in payment for foreign flax, and seed, &c.; and with this foreign aid our flax-spinners, for many years past, have not had anything like the supply they need, even for their present limited works; but were the growth of flax encouraged as it ought to be, there would be no difficulty in producing it in our own country, to the extent in monetary value of fourteen or fifteen millions, or more, if needed, without any disturbance of the usual agricultural course.

It is not easy to estimate all the advantages which would thus accrue to our country, in an agricultural, manufacturing, and commercial point of view.

Our climate, again, is singularly suited to its growth. Moisture is evidently essential to the healthy production of its fibre. Hence it flourishes so well in Ireland; and this is no slight recommendation to a crop in a climate so humid as ours; indeed it seems a point peculiarly commending itself to the consideration of agriculturists, who may thus compensate themselves for a failing crop of wheat or barley by an abundant one of flax.

The short space of time for which it occupies the land must also be in its favour; being sown in April, it may frequently be gathered in July. It is very true that flax demands care in the preparation of the soil, care in the selection of seed, care in the clearance from weeds; yet these ought rather to be classed among its recommendations than its drawbacks, as such care, while it almost insures a profitable crop, results also in permanent benefit to the land.

As regards the actual return made by a flax crop to the farmer, it is well understood amongst those who have been accustomed to grow it, that the entire expenses of preparing the land, sowing, and gathering, including rent, &c., ought not to exceed £10 per acre, while the average produce of the straw and the seed may be very fairly estimated at £15. Much more than this is frequently obtained; and, of course, from unpropitious seasons, inferior seed, or injudicious management, the result will sometimes be less. In Ireland far more than this is realised by the small farmers, who set their small quantities of flax themselves, and carry their fibre direct to the spinners; but this is a course by no means suited to the English farmer, whose interest it is to sell his straw at once to those who at their retteries prepare the flax for the spinner's use.

Of the value of the seed for the farmer's own use, independently of its worth as a product for sale, it would seem to be difficult to say too much, though here again care is requisite in its administration, whether in the fattening of bullocks, calves, &c., or as an element in the food of horses, or as an aid in carrying lean stock through the winter, or as nourishment for ewes in the lambing season, and in all these cases returning most valuable manure to the land; but so much has been said on this subject by Mr. Warner and other practical writers, that it would be superfluous to go into further details.

Having said thus much on the advantages of this crop, it may be well to touch upon the objections which have been sometimes advanced against it. These are chiefly limited to two, viz., its supposed exhaustion of the soil, and its interference with the harvesting of other crops. The former objection has indeed been often made; it is as old as the days of Virgil; and it is quite possible that, in the then state of agricultural science, there might be reason for the charge of its "burning" or exhausting the land. This was the natural result in our own country previous to the introduction of the system of a rotation of crops, and of restoring to the land, by natural and artificial manures, those inorganic substances which the plants had extracted from it. Flax and hemp were both grown formerly as articles of domestic necessity, without reference to the nature of the soil, and with little or no aid from manure, the small stock of of which was of course reserved for the grain or food crops. It is not unnatural, therefore, that a crop thus grown constantly on the same land should have come to be looked upon as exhausting, but it is now well-known that, where attention is paid to the suitable nature of the land, and due care bestowed on its treatment, flax is, in proportion to its value as a crop, less exhausting to the land than several others which are regularly grown. Experienced farmers admit that, on suitable land, it creates no undue impoverishment, while it leaves the soil in a peculiarly good condition for the succeeding crop. Nay, it has been grown (although such a course is by no means recommended) on the same land each alternate year for eight or ten years, without producing any symptom of unhealthy exhaustion, the grower having, in fact, almost every year carried away the prize for the best crop of flax grown in that particular neighbourhood.

It would perhaps be an interesting point to attempt to ascertain how much more a plant of such rapid growth as flax owes to water and to atmosphere than it does to the soil in which it grows; and surely there is nothing in the character of its roots or in the quantity of its seed to demand any unusual degree of absorption from the land, although it may possibly extract some properties which, if we could have our entire will, we might wish

to retain for a subsequent crop; but even in such case no injury can accrue, as, from the small quantity of land which it is desirable to appropriate annually to flax, viz., one-twentieth part only of the arable portion of a farm, so many years would elapse before the crop returned to the same plot, that any idea of injury from exhaustion is utterly out of the question.

The objection of its interfering with other harvesting operations, will not, as a general rule, be valid, under proper management. If the land be in good heart, the seed of the right kind, and sown before the middle of April, it will usually be ready for pulling about ten days before the general harvest. Flax from Dutch seed is indeed of slower growth than that from Riga seed, and has often been the cause of this annoyance, having been frequently used on account of its larger yield of seed. It should, however, be carefully avoided, not only on account of its more tardy maturity, but because the fibre extracted from it is comparatively worthless. Again, if the quantity grown be restricted to the proportion above stated, this is of itself almost a sufficient security against any inconvenient interference with other harvest work.

Here, then, it may possibly be asked—If the growth of flax be so desirable for the linen manufacturers, and so remunerative to the growers, how comes it that so little is produced in England?

Several reasons may be given:—

1st. The impression entertained that it exhausted the soil, and that, being pulled up by the roots, it left nothing on the farm in the shape of either stubble or straw, led to the introduction of a clause in the old leases prohibiting its growth; and although this prejudice may be said to have all but passed away, there are, even yet, some few landlords so strongly wedded to all the systems of their forefathers, without troubling themselves to ascertain their origin, or to weigh their merits, or to reflect upon their consequences, as still to continue this impolitic prohibition.

2nd. The remunerative price of wheat and of live stock in past years, caused farmers to be little inclined to experiment upon a plant of which the present generation knew little, except that it had almost ceased to be grown; and that, therefore, even where it was not prohibited, there were, probably, sufficient reasons, without troubling themselves to analyse them, why they should not attempt to reintroduce it. The present times, however, seem to militate against these easy-going conclusions. The increase of railways in the great corn-growing countries of the Continent is greatly facilitating the importation of both wheat and cattle into England, so that corn, except it be, as in the past year, of almost universal extension, will scarcely now hold out its *dernier* consolation of enhanced price. Wheat, therefore, no longer holds its former high position in the farmer's estimation; and the cultivation of so remunerative a crop as flax, though grown to a less extent, would be found a most important addition at the year's end, to his sources of income.

3rdly. And this is perhaps the most cogent reason—the want of a market for the flax when grown. There would be no wisdom in a farmer growing flax unless he had a ready means of disposing of his flax straw as well as of his flax seed. In Ireland, as previously mentioned, the holdings being generally very small, the farmer steeps and dresses his little bit of straw for the spinner by the manual labour of his own family and where the growth is larger he can carry it probably to a not far distant scutch mill, of which there are a good many hundreds spread over the country. In England a farmer generally holds as much land as he can manage; and to fetter himself with the intricate operations of steeping, drying, rolling, and cleaning his flax, on any considerable scale, would be not only very difficult and irksome, but probably from want of the necessary skill and care in the various operations, very unprofitable also. Sufficient for him is the growing and selling it at a remunerative price. It is therefore absolutely necessary, as a concomitant to the growth of flax, that retteries for cleaning it should be established in the various parts of the country where it is produced, on a scale sufficient to be able to purchase the flax grown within a radius of about 10 miles, this being about as far as it would be desirable to cart it. Wherever such retteries have been established and prudently conducted, they have given very profitable results, and have conferred great benefit upon the agriculturalists of the neighbouring districts by purchasing their flax, and thus encouraging its cultivation; and it is clear that the subject only requires to be better and more generally understood, to lead to a much increased development of this very interesting branch of trade. It is true that in cases where such works have been undertaken by persons without experience, without the necessary machinery, disappointment and failure have resulted; but there is perhaps no branch of trade which holds out a greater assurance of profitable return at the present moment than a flax rettery judiciously conducted upon well-arranged principles, and furnished with the machinery best adapted to the purpose of thoroughly and economically preparing the flax fibre for the spinner's use.

And this brings us to the point which we should probably have reached sooner, had it not seemed reasonable that, before treating of the machinery best suited for the preparation of the flax we should endeavour to establish the position that a greatly increased production is really needed by the spinner, and that it would be very remunerative to the grower, as well as a source of much good to the public at large.

It may seem singular, at first sight, that more rapid progress has not been made in the successful adaptation of machinery to this object; there is, however, a very peculiar nature, subtlety, and delicacy, about the flax fibre, which renders its judicious treatment a matter of no ordinary nicety and of no little study, and which demands the greatest care in every stage of its manipulation. There has indeed been no lack of machines introduced for this purpose; but, up to the present time, the result of most of them has been very unsatisfactory.

Although it is generally known that the thread from which linen goods are made is obtained from the flax plant, it is believed that a very small proportion of the inhabitants of England ever saw flax growing, and that a still smaller proportion have any clear idea by what processes it is prepared for the manufacturer. It may indeed be quite unnecessary here to enter into explanations of this nature; yet the remarks upon the machines themselves would scarcely be intelligible, unless preceded by some account of the work they have to perform.

These processes then, after the plant has been pulled up by the roots, and allowed to dry in the field, are as follows:—viz., seeding, steeping, rolling, drying, stacking, breaking, scutching, and sorting.

1. The first process, that of taking the seed from the plant, is effected by holding the root ends of the sheaf in the hands, and whipping the seed ends a few times quickly between two iron rollers, so fixed that one end of the roller remains open for the free passage of the straw, and set close enough to each other to crush the bolls and allow the seed to fall out without doing any injury to the seed itself. This is a very simple and useful machine, and a great improvement on the previous methods of thrashing or rippling.

2. Then comes the steeping or retting process, still carried on, in some places, in sluggish streams, and in others in pits formed by the aid of streams. By this means however, flax can only be steeped in the warmer months of the year, and even then the variations of temperature render it a very uncertain and tedious operation, occupying from ten to twenty days, according to the state of the weather, and often very imperfectly performed. The object of steeping is to produce such a degree of incipient fermentation, as may soften and remove the glutinous matter, and facilitate, in the sub-

sequent processes, the separation of the fibre from the woody portion of the plant, guarding at the same time against proceeding so far in this operation as to injure the nature and strength of the fibre. This, on a manufacturing scale, is done by means of large vats, in which the water is maintained at one uniform moderate temperature at all seasons, and the process, though requiring watchfulness and care, is accomplished without any uncertainty, and with an immense saving of time.

3. As soon as the straw is sufficiently, and not more than sufficiently steeped—a point of the greatest importance, as on it rests, to a great extent, the ultimate value of the flax—instead of being carried at once to the drying ground, the sheaves are opened, and passed through a machine having several pairs of heavily weighted rollers, with a copious shower of water, falling upon them in their passage through it. By this washing and pressure a large quantity of green glutinous matter is extracted, the release of the fibre from the epidermis and from the stem facilitated, and the fibre much improved in colour and quality. For this washing and rolling process obligations would seem to be due both to Mr. Watt and to Mr. Pownall.

4. The next process (drying) must be atmospheric. Every rapid mode of artificial drying has been found prejudicial to the strength of the fibre; and any lengthened process, by steam or otherwise, would, even were it practicable, involve the necessity of too great an extent of covered space. Spreading on the fields and turning is the usual mode; but the use of horizontal wires, at 18 or 20 inches from the ground, supporting the flax, with its root ends only resting on the ground, insures a great saving both of time and space.

5. When dried the straw should be carefully tied up in sheaves and stacked, and it is desirable that it should so remain for two or three months. It seems thus to recover its nature, and to acquire a mellowness and quality which enhances its value, and also renders it easier to clean.

6. Then comes the separation of the fibre from the woody part, as a preparation for which the flax is passed through what is called a breaking machine, having several pairs of fluted rollers. The intention of these is to crush and break the stem into small portions, and so loosen it from the fibre, that the next process—the scutching, or actual removal of all the woody part—may be comparatively easy; but in this very essential point—a point on which the successful treatment of flax would seem to depend—these breaking machines hitherto appear to have signally failed, and it is more than probable that it is from the want of a better principle at this particular point of the work that many have been deterred from entering upon this really interesting occupation, and that thus the cultivation of flax has been indirectly discouraged.

It must be premised that the essential principle in cleaning flax is to do it without injury to, and without waste of, the fibre. Now, every process of scutching, as the term implies, is by striking the flax; and it is very difficult indeed to give a blow of any kind to this fibre without either breaking some portion of it, and thus converting it into tow, or, if not actually breaking it, so chafing and weakening it as sensibly to diminish its value. Hence the introduction of the breaking machine. Its object was good, but the inventors have failed to accomplish their intentions. It should have absolutely removed a large portion of the shive, or woody matter, and have so broken and loosened the remainder that in the subsequent scutching there would be very little to do, for it must be borne in mind that it is not in the breaking, but in the scutching, that the tow is made. The former, therefore, should have done nearly all the work, merely leaving it to the latter to give the finishing stroke, but in this it has substantially failed. The action of the breaking machines in general use simply flattens, softens, and bruises the woody stem, but it does not remove it. The scutcher, therefore, still has this to do, and in doing it, whether making use of the Irish stock or any other mode, he contrives—not from any fault of his, but from the nature of the machine he uses—to convert so much of the fibre into tow, or to leave so much of it adhering to the broken straw, that the average yield of finished fibre from a ton of green straw is generally calculated at about one-eighth part, *i.e.*, that it requires about eight tons of green or unretted straw to produce one ton of flax fibre.

Now the natural yield of fibre from the stalk of the flax plant is about 1 in $4\frac{1}{2}$; in other words, if it were possible to preserve every particle of fibre, without any loss whatever in the process of cleaning, it would require about $4\frac{1}{2}$ tons of green flax straw to produce one ton of finished fibre.

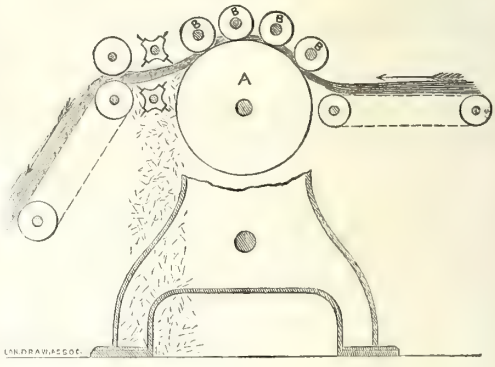
Surely, then, there exists here a wide margin for improvement. It would be an unnecessary trespass on your time to attempt to enumerate the various machines, with their numerous and ingenious contrivances, to accomplish this seemingly easy, but in reality delicate and difficult operation of cleaning flax. Some have been too costly, others too complicated, others too severe in their action, all too limited in their yield, and all failing to demonstrate the fundamental principle, that the main separation of the woody portion from the fibre must be made while the flax is retained in such a position in the machine as not to admit of the possibility of any considerable portion of tow being torn from it.

Now, this most desirable consummation has at length been achieved; and it is to this striking and most important improvement that your especial attention is now requested.

The breaking machine, a model of which is on the table before you, has been constructed by Mr. Brasier, a practical engineer, who has had a large experience in flax machinery, and whose sagacity and reflection led him to the conclusion that the scutcher was a most wasteful machine as hitherto applied, and that the work of separating the fibre from the shive must be mainly, if not altogether, accomplished by the breaker, which makes no tow, and not by the scutcher, which makes a great deal.

The machine, as you will observe in Fig. 1, consists of

Fig. 1.



one large fluted cylinder or roller, A, on which work four small rollers, B, B, B, B, also fluted, resembling somewhat in this respect the construction of the cotton-carding engine. The object of these rollers, like that in all other breaking machines, is to crush and break the woody part; but in order to accomplish this much more effectually than any other has succeeded in doing, a reverse motion, shorter in duration than that of the forward motion, is added, so that the gradations are, in fact, a long forward motion and a shorter reverse motion, a second forward motion and a second reverse, and a third forward motion, which carries the ends of the flax on to receive the ac-

tion of four small beaters fixed upon a horizontal axis' which, revolving continuously in one direction, thus obtain a double relative action on the flax during the time that it is drawn backwards and forwards by the compound action of the rollers.

The principle upon which this reciprocating motion is given is to be found in the natural movement employed by the human hands in rubbing out the husk from any other matter by which it is surrounded, or which it surrounds; thus, in rubbing out corn from the chaff by hand, you naturally give a reciprocating motion to the hands, and in breaking flax straw from the "shive," exactly the same movement is almost involuntarily given which is imitated in the present machine.

Thus, to a great extent, the combined action of a breaker and a scutcher is comprised in this very ingenious machine, and so happily that, while a very great proportion (about three-fourths) of the shive is actually removed from the flax, and the remainder so loosened as to be very easily cleared away in the subsequent process, the cleaning action performed by the beaters is effected while the flax is being held in such a position by the rollers as to prevent the formation of any appreciable quantity of tow, and the dust of the scutching mill, which is so prejudicial to health, and so annoying on the present system, is entirely done away with by the use of this machine.

There are other merits in the construction of the machine which can scarcely be represented by the model, the object being to make the working as smooth and true as possible, with the smallest possible amount of power, which does not exceed that of one horse; while the quantity of flax straw which the machine has been tested to operate upon in the day of ten hours, attended by three boys or girls, is about 80 stones of 14lb.

In speaking of the results of this machine, it may be stated that it has been now at work for many months, during which it has been brought to its present state of efficiency, and that there has therefore been ample time to judge of its practical utility.

The average of the trials made from straw purchased in the dried or retted state, is as follows:—

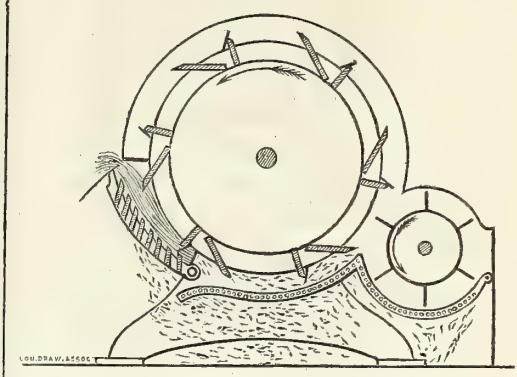
100 lbs. retted straw yields of scutched flax	25·50
It also yields of long tow 7 lbs. = 39 per cent. of flax	2·72
And of short tow 3lbs. = 26 per cent. of flax	·78
	29·

Now 100 lbs. of retted straw represents about 150 lbs. of green straw, about one-third of the weight being lost in steeping and drying. Therefore, a yield of 29 lbs. flax from 150 lbs. green straw equals one ton of flax from 5⅓ tons of straw, instead of the general average of one ton of flax from 8 tons of straw, making a difference of 2⅔ tons of straw in every ton of finished flax. But supposing we allow a large discount for too favourable experiments on cwts. as compared with actual trade results when working by tons, and, instead of calling the yield one ton of flax from 5⅓ tons of straw, we call it one ton of flax from six tons of straw, we have still a saving of two tons of straw in every eight, or 25 per cent.

It must also be borne in mind that the saving of one-fourth part of the flax straw would not be the only advantage, but the labour also on a fourth-part less quantity of the raw material, which on so bulky an article is very great.

The machine, however, which has been just described, it must be remembered, does not profess to be a scutching, but a breaking machine, although it does, in fact, possess, to a very considerable extent, the attributes also of a scutcher. Its inventor has, therefore, after a thorough examination of the various machines, now, and at former periods, in use, for this last operation of scutching, constructed a machine (Fig. 2) which seems to be all that need be desired to complete the process.

Fig. 2.



One feature in this scutching machine is the construction of the stock, which is so hinged and balanced that, by an almost involuntary action on the part of the operator, the amount of blow given to the flax under operation, can be perfectly regulated, and thus all loss from undue severity, entirely obviated. It has also the following great improvement attached to it.

It has already been stated that all scutching machines must necessarily make some amount of tow. To this machine, then, has been connected a contrivance (shown at the end of the machine) for at once catching the tow, freeing it from the adhering "shive," and thus delivering at the same time, but from opposite sides of the machine, the flax and the tow—both cleaned.

One other very important advantage of the combined use of these two machines must not be lost sight of. The present general mode of scutching flax by means of the "Irish stock" involves the necessity of employing skilled labour, and the workman who with this machine turns off his three or four stones of flax daily is in the receipt of some 20s. or 22s. per week, the result being that, by this process, the cost of scutching is from 12d. to 14d. per stone; whereas, by the use of these two machines of Mr. Brasier, worked by youthful and unskilled hands, the cost per stone would not exceed 4d. to 5d., independently of the great saving of fibre already alluded to. Touching the last process—"sorting the flax for market"—as no machinery is required, no special notice seems to be needed.

Briefly to recapitulate, then, the advantages to be obtained by the use of these machines, we have:—

1st. The saving of 2 tons in every 8, in the cost of flax straw.

2nd. The saving of the labour on these 2 tons.

3rd. The saving of 7d. to 8d. per stone in the breaking and scutching.

4th. The employment, in this last process, of unskilled, instead of skilled labour, the importance of which manufacturers at least will be at no loss to appreciate.

In conclusion, the author would remark that the foregoing observations have been approved by one who has had a considerable practical experience in the preparation of flax, though not now engaged in it, and who has, moreover, no pecuniary interest whatever in connexion with the machines; but who, having suffered from the imperfections of those hitherto in use, and having satisfied himself, by personal inspection, of the advantages of those which have now been but imperfectly described, is well able to give an opinion; he therefore considers it but right to give this public testimony in favour of an invention which he believes calculated to confer very important benefits upon an exceedingly interesting, though hitherto too little appreciated branch of British agriculture and British commerce.

DISCUSSION.

Mr. Botly said he should be happy to learn that the machines, of which an explanation had been given in the paper, would be likely to supersede the very primitive methods in which the produce was formerly treated by the labouring population who grew it in small quantities. He quite agreed with the author of the paper as to the desirability of encouraging the growth of flax in the United Kingdom, and especially in Ireland, but he hoped Mr. Young did not mean to imply that the encouragement was to come from the Government. For his own part he was entirely opposed to Government assistance of any kind in such matters.

Mr. B. Fothergill (responding to the invitation of the Chairman) said he had not intended to take part in this discussion, but he would state what his experience had been in connexion with machinery of this description. About the year 1834-5, when he was connected with the firm of Messrs. Sharp, Roberts, and Co., of Manchester, he constructed one of the earliest scutching machines invented by Mr. Gerrard, a remarkably ingenious man, who derived his ideas of what was required in these machines from observing his wife combing her hair. Observing that if the comb were introduced into the hair near the roots, entanglement ensued, and there was a tendency to tear the hair, but that if introduced near the ends, and gradually carried higher up, no such entanglement took place, it occurred to him that machinery for the combing of flax should be made to operate upon the same principle. The invention of Mr. Gerrard proved very successful, but unfortunately the machine possessed the fault to which reference had been made in the paper, namely, that in this operation, the fibre was broken to a considerable extent, and a great quantity of tow was produced. After that another machine was invented, which was shown at work in the Exhibition of 1851, and patented by Mr. Plummer, of Newcastle-on-Tyne. That was an excellent machine and a great improvement upon all contrivances with which he was acquainted up to that time; but as he (Mr. Fothergill) had now left Manchester for several years, he had got out of the sphere of the flax, cotton, and wool trades, and he had not followed up the history of invention in connection with those industries. He might mention that his father started the first flax mill in Darlington before the commencement of the present century, and with the assistance of his (Mr. Fothergill's) two brothers, machinery for the preparation of the fibre was set to work. At that period they had a contrivance, something analogous to the second machine described by Mr. Young, for operating upon the flax. Still there were the defects with regard to the breaking of the fibre, to which reference had been made, and from that time to the present those defects had more or less existed in all the flax machinery that had been introduced. He, however, thought the combination of the fluted cylinder having fluted rollers, as in the first machine described by Mr. Young, with a reversing action, must be ranked amongst the best contrivances in respect of machinery of this description. The only doubt he had with regard to the machine now before them was whether or not there was a tendency to carry over some of the loose fibre, and thus cause entanglement and waste. If this did not happen he congratulated the inventor on having produced a contrivance which, in his (Mr. Fothergill's) opinion, would well answer the purpose. With regard to the second description of machine, he thought that was somewhat of the character of a modification of the Oldham "willow;" but there was a point in connection with it on which he would ask a question, viz., whether the tow which came from the flax was carried forward and delivered at the other end of the machine in a confused mass of long and short together. If so, he thought the introduction of a second cylinder, to separate the long from the short lengths, as in the carding machine, would prove an advantageous addition.

Mr. Conisbee said he was at present constructing a flax-breaking machine, under the patent of Mr. J. Hill Dickson, but it differed from that on the table, inasmuch as it had a horizontal reciprocating action; and he considered it a far superior machine to that described by Mr. Young. There was in the machine he had alluded to, a table, constructed like a gridiron, with open bars. The cylinders were four in number, and each cylinder was placed on a separate axis, furnished with pressure springs, so that it could act upon four different streaks of flax at the same time. All the straw fell through the gridiron; and he could state, from his own knowledge, that a machine of this kind, 12 ft. long, did not make a pound of tow per day. The flax was passed gradually along the table, and every portion of the straw was exposed to different pressures, produced by rollers of different pitches, till every part of the woody substance was broken out, while the fibre remained entirely unbroken. He had not tested the actual quality of work done by this machine, but his impression was, that as two persons could be employed in feeding at each end of the machine, it would be capable of doing double the quantity of work which the machine before them could do.

Mr. Crewe said that the machine before them appeared to him to be a combination of the American jute softener with the ordinary flax-breaker. It was impossible to get a good preparation of the fibre unless proper attention was paid to the retting; and in many parts of Yorkshire there were pits on common lands to which the people had access for that purpose; but unless the steeping was done at the proper time the fibre became weak and a great quantity of tow was made.

Mr. Johnson Wilson said, having acted as consulting engineer to the member for Fifeshire for several years, during which time he had erected and managed large works for the manufacture of flax straw, consuming the produce of about 800 acres of land, and producing about 3,000 tons of flax per annum, he might be permitted to offer a few remarks on this subject. He had found no difficulty in getting farmers to grow flax; in fact, most of them liked that crop very much. The yield of the crop was very fairly stated by Mr. Young, the average being from £14 to £16 per imperial acre. Sometimes it might be as low as £10; at others it was as high as £18 and £20 per acre, when grown on suitable soil. There was, in the case to which he referred, an excellent market for the seed to the linseed crushers, who readily purchased at a certain price per bushel all the seed that could be produced. It was the seed which extracted the most from the soil; the fibre really took almost nothing, but if the farmers used the linseed cake for their cattle, a great portion of it was returned to the soil in the shape of manure. The straw was often brought from greater distances than ten miles; frequently 20 and even 50 miles; in the latter case by railway. Improvements in the steeping had been introduced which increased the value of the flax very much. This operation was performed in a large vat house, and the fermentation of the straw was promoted by the introduction of a small running stream of warm water, in imitation of the Courtrai system, and this was found to increase the value of the flax very much, as it washed away the greater portion of the gum as well as promoted fermentation. Flax manufactured at these works had been sold at £130 per ton. As had been remarked by the author of the paper, the scutching had always been the great difficulty in the manipulation of flax, and he believed that had been the principal barrier to the extension of its cultivation. He had brought with him a return of the average results of several years' working, which would be found to be as follows:—

Cost.

	£	s.	d.
10 tons of straw, at £3 10s.	35	0	0
Stacking	1	0	0
Seeding	2	10	0
Steeping and drying seven tons	1	15	0

	£	s.	d.
Scutching	8	10	0
Sorting and baling	1	5	0
	50	0	0
YIELD.			
50 bushels of seed, at 5s.	12	10	0
200 bushels of chaff, at 3d.	2	10	0
One ton of flax	60	0	0
Three cwts. of tow, at 5s.	0	15	0
	75	15	0
Less cost as above	50	0	0
Office, fuel, repairs, mill stores, &c.	4	0	0
	54	0	0
For interest and profit	21	15	0

He considered this to be a fair profit upon the manufacture, and he was of opinion that it was a trade which ought to be extended in this country. If the Government offered a prize of £1,000 for a perfect scutching machine, the advantages, especially to Ireland, would be very great, and would be well worth the money; and, he thought, if landowners saw their way to the manufacture being easily and successfully conducted, it was a crop so suitable to this climate that it would become very extensively cultivated.

Mr. Fothergill suggested that an improvement would be effected in the machine now before them if the rollers, instead of being fluted straight across, were grooved in a spiral form, as he thought this would tend to break off the shive in shorter lengths, and the shorter they were the better.

Mr. D. Roberton Blaine said, with regard to the agricultural part of the question, he understood from the paper that the cost of producing flax to the farmer was something like £10 per acre, but it did not seem to be clear what was really the profit to the farmer per acre. He apprehended that the success of the crop depended very much upon its being grown on a soil suitable for it. From all they had heard there could be no doubt that our climate was well adapted for its cultivation. A good deal of flax, he believed, was produced in the east of Italy, where the soil was light, and there was a good deal of water; and travelling in those parts one saw the ditches filled with flax, steeping in the rough mode adopted there. He entirely agreed in the opinion expressed as to the extreme desirability of promoting the extension of the cultivation of flax in this country; but it came in the end to the question of the amount of profit at which it could be carried on in comparison with the ordinary grain and root crops.

Mr. Johnson Wilson thought Mr. Young had rather overstated the cost of production at £10 per acre. He thought it was under that, including rent, so that there was a profit to the grower of between £4 and £5 per acre. The best quality of flax was that grown on a loose soil, with a clay bottom, the woody portion of the straw being very thin. When grown on a light gravelly soil the reed was strong, and the fibre light and deficient in quality, and a great deal of seed was produced. The flax cultivation in Fifeshire received a check during the period of the Russian war, owing to the high price of wheat, but it had been again taken up there.

Mr. G. B. Galloway spoke in favour of the more extended cultivation of flax, a produce which had so important a bearing upon the commercial interests of the country. He did not agree with the first speaker in his condemnation of Government assistance and encouragement of inventions. In his opinion, if more assistance had been given to inventors this country would have been even greater and richer than it was now.

Mr. Wood (responding to the Chairman's invitation) said not being a flax manufacturer, and having no special knowledge on this subject, he could not add anything upon it. With respect to what had just been said on the question of Government patronage of inventions, he might say he had been an inventor for 30 years, but he repudiated wholly any government patronage. Inventors should be content to stand or fall by the merits of their inventions. All he asked was that the Government should let them alone.

Mr. Campin, on the subject of government patronage to inventors, said it seemed to him, however undesirable such a patronage might be in a general point of view, yet in matters of great national importance they were not without instances of good results having accrued from such a course.

Mr. Bishop remarked that when travelling in Italy he observed that in spots where sunken lakes existed in extinct volcanoes, the people chose that water in preference to any other for steeping the flax in, and from inquiries he made he found that that preference was owing to the benefit which the flax appeared to receive from the chemical ingredients with which the water was charged.

Mr. Johnson Wilson said everything which tended to keep the water sweet during the process of fermentation was beneficial to the flax.

Mr. Hancock said, in addition to the question that had been raised as to the average profit realised by the produce of flax, there was another question, which he thought had an important bearing upon the case—viz., whether flax must not be regarded as an uncertain crop. He recollected, when travelling in the north of Ireland, that great anxiety was felt as to what the produce of the next flax crop would be; and he believed the difference between the yield of one year and that of another was very considerable.

The Chairman begged leave to propose a vote of thanks to Mr. Young for having brought this subject before them, and for the able manner in which he had dealt with it. No doubt it was a question very important to agriculturists and also to manufacturers. The extent to which flax might be cultivated in this country must, in a great measure, depend upon the facilities which the neighbourhoods afforded for getting the produce to the market. No doubt railways had greatly contributed to those facilities, and might make flax a profitable crop now where it was not so formerly. It was also necessary to be within reasonable distance of seed-crushing establishments; for though the seed might be used as food for cattle without crushing, by mixing it with chaff, still the most profitable use of it was when the oil was extracted by crushing, and the cake used as cattle food. With regard to the economy claimed by Mr. Young in the use of the machines he had described, it was stated that that which cost about 14d. per stone could be done for 5d. by this machine; if so, that was an enormous economy; and from what he had seen of the operation of the model the work appeared to be well done and the fibre uninjured. Certainly, if this machine were as successful as it appeared likely to be, it would sufficiently remunerate the inventor, irrespective of any patronage or aid from Government. His own opinion was that prizes offered by Government would never lead to important inventions. Any premium which the Government could give for a really valuable invention would be insignificant compared with that which would be derived from its commercial success. There had always been great difference of opinion on the subject of the Patent Laws, and he was not going to enter upon that this evening further than to say that in his judgment, if they could not be maintained on the ground that they were for the benefit of the country generally, and not merely of the inventor, he did not think they could be upheld. He was sure the meeting would agree with him that Mr. Young was entitled to their cordial thanks for his paper.

The vote of thanks having been passed,

Mr. Young acknowledged the kind manner in which his communication had been received by the meeting. He thought it most important that local agricultural societies and landowners should stimulate the growth of flax in this country. The severe lesson which we were

taught by the late American war, in reference to cotton, was, he thought, sufficient to show the importance of our being as far as possible independent of foreign countries for raw materials of this character. He had been much gratified by the approval of this machine which had been expressed by so eminent a practical mechanician as Mr. Fothergill. The work done by the little model before them bore no comparison to what the machine itself effected. It merely served to illustrate the way in which the thing was done. With reference to Mr. Conisbee's remarks he (Mr. Young) was happy to hear that Mr. Dickson, who had been trying his hand at this matter since 1851, had at length arrived at what he regarded as a successful result. He was informed that the weight of that machine was from six to eight tons, while that he had described weighed only about 5 cwt. The objection he had heard to Mr. Dickson's machine, so far as he understood it, was that it required that the flax should be passed through it twice to accomplish the complete breaking of the shive, only one side being broken at a time, whereas, in the machine he had described, the straw might be passed through very rapidly, and the process of breaking the shive was thoroughly effected by one operation. He agreed with the Chairman as to the great importance of growing flax where there was easy means of access to and from the mills. He might add that one great point in favour of the machine he had described, as regarded its application in agricultural districts, was the fact that it entirely dispensed with the necessity for skilled labour. With regard to what had fallen from Mr. Hancock, he did not think flax was a more uncertain crop than any other. The ground might be unsuitable, and an unfavourable season might retard the crop and lessen the yield, but it was no more uncertain in that respect than wheat, or any other crop. To return to the subject of the machine, the figures he had given were not the result of experiment only, but of actual work done by it. He had seen it in working for several months, and he was altogether so pleased with its operation, that, without having the slighest pecuniary interest in it, he was anxious that it should be brought before the public, and he had taken that task upon himself.

Proceedings of Institutions.

Pendleton Mechanics' Institution. — The sixteenth annual report states that considerable progress has been made. The finances of the Institution bear a more favourable aspect; the receipts have been £280 8s. 8d., and have exceeded the expenditure by £65 0s. 0½d., thus reducing the debt to £80 11s. 3d. During the year the directors have lost the services of some active members of the board by change of residence. The loss of the services of Mr. C. D. Cartwright and Mr. Allcock is especially regretted. The number of members of the Institution is 235, an increase of 62 on the former year. In the female class, which is taught gratuitously by the Misses Phillips, the pupils make rapid progress. The number on the books is 24; the average attendance 16. In the adult male class the attendance has been very satisfactory. The number on the books is 40; the average attendance 20. The juvenile male class has been well attended. Particular attention is given to imparting a fair handwriting, and the reading lessons are chiefly in English History. Elementary arithmetic is also taught. The number on the books is 29; the average attendance 18. In the drawing class the number on the books is 13; the average attendance 9. In the French class, the number on the books is 15; the average attendance 8. The chemistry class has been taught by Mr. Hartley, a Government science teacher. The number on the books is 11; the average attendance 7. In the short-hand class, which is of comparatively recent establishment, the number on the books is 10; the average attendance 6. The total number of members who joined the gymnasium during the year is 87. The number of volumes in the library is 1,657, being an increase of 31 volumes over the previous year. The average number of volumes issued per month has been 252.

PARIS UNIVERSAL EXHIBITION.

The opening of the Exhibition is officially announced for the first of April; no particulars are added, but it is understood that there will be no state ceremony. A large number of workmen are employed in getting the grand vestibule ready for the opening day; the wood work of the two sides, which form the boundaries of the French and English sections, is finished, with the exception of the last touches of the decorator; and the stained glass of the two countries begins to make a very handsome show; that which is already in place is fine in colour, harmonious in tone, and solid as regards method of treatment These windows will bring French and English artists into direct competition, and, judging by what is now visible, each has a formidable rival in the other. The clerestory windows of the vestibule are admirably adapted for the purpose in every respect, though of course the two sides are not equally advantageous as respects light.

The two commissions are naturally intent on showing some of their choicest specimens at this spot, and the sides of the grand vestibule will be occupied, to use the old exhibition term, by series of trophies. The most conspicuous for the moment is a collection of casts of decorative sculpture, from South Kensington; the reconstruction of the celebrated pulpit by Nicolas Pisano the younger; portions of the famous *Gloria* of St. Iago in Spain; and a Venetian tomb.

The machinery in the British department is now getting into something like order, but there still remains a great deal to be done before many of the machines are ready for work. The boiler house is now practically finished, and the steam piping, shafting, &c., nearly completed.

The American coal-burning locomotive, with its boiler and chimney covered with German silver, is now completed. The driving and trailing wheels are 5ft. 6in. in diameter, and are coupled together. The front part, with its cow-catcher, is mounted on a four-wheeled truck. The tender is also on two four-wheeled trucks. The cylinders are outside, 16 in. in diameter, with 22 in. stroke. The "cab," or housing for the engine driver, is in polished wood, in true American fashion, and is well finished. The rails upon which the engine stands are laid with Dering's patent rail-fastenings.

The Chemin de Fer de l'Est send one of their two-storey carriages, to accommodate eight passengers, first, second, and third class.

The English barrack hut is now being fitted up. It contains compartments for the exhibition of various articles of barrack and hospital furniture and fittings, and contains specimens of a soldier's barrack room, lavatory, sergeant's or married soldier's quarters, a troop stable, recreation room, hospital ward, and offices attached to the hospital.

In the Swiss annexe, Messrs. Escher, Wyss, and Co., of Zurich, have completed a pair of 120-horse power engines, for lake or shallow river navigation. Here also is exhibited a good deal of agricultural machinery.

The Dutch are exhibiting a great deal of railway plant in a building for that purpose in the park.

In the French marine engine building are the three cylinder 960-horse power engines for the *Friedland*, made at Indret. Four of the boilers are being fixed. The cylinders are 82½ in. in diameter, with 5 ft. stroke. The propeller is four-bladed, 19 ft. 6 in. in diameter. These engines will be employed during the Exhibition for the purpose of pumping water from the Seine to supply the fountains, &c., in the park.

The English marine engines are not so forward. Messrs. Penns' screw trunk-engines, of 350-horse power, are at last being erected. The Société John Cockerell, of Seraing, are putting up a large vertical blowing engine with 9ft. cylinder.

In the way of decoration the iron work of the British section is being relieved with gold lines, which will harmonize well with the olive-green colour of the iron, the rich dark crimson draperies, and the black and gold of the majority of the cases. But the most novel and characteristic piece of decoration is that adopted by the British commission for the eighty great windows of the machinery gallery; these are being rapidly filled with transparent blinds, stretched on frames, each recording the fame of a British inventor or improver. A picture of the machine itself occupies the centre of the blind, and above and below is the description of the invention and the name of the inventor, with dates and other particulars. A better method of staining this immense range of windows could hardly have been adopted, and the list will supply a remarkable chapter in the catalogue of the English section of the exhibition.

The collection of books, periodicals, and newspapers published in the United Kingdom and its dependencies in the course of the year 1866 begins to attract attention; it is one of the noblest exhibitions that Great Britain can make, the only drawback being that in this case it is impossible to show much more than names and titles. But Dr. Johnson said that the next thing to having read a book was to know where to find it, so that those who are not yet acquainted with our literature will at any rate have an opportunity of learning something about it this year. One branch of the subject, that of illustration, is well exhibited by specimens under glass. The books amount to about 5000, and the newspapers to nearly 1200; the number of the periodicals and serial works is also large.

Workmen are now occupied in fitting iron doors to the English picture and retrospective galleries; when this is done, which will be in a day or two, the works of art may be at once arranged, and the chance of accident will be reduced to a minimum.

The English carriages make a good show, though unfortunately placed in the machinery gallery, while those of France have a separate department. There are 24 exhibitors, who show nearly 40 carriages of various kinds, from a dog-cart to a dress landau.

The Trinity Board has a fine exhibition. Besides the magneto-electric lighthouse, and two steam fog-horns, which will be found in the garden, there are, in the machinery department, a first-class fixed catadioptric Fresnel lens, with shadowless lantern; a first-class revolving lens, with improved clock-work, the glass work by Chance, of Birmingham; one fixed, and one revolving floating light; a large number of models, including Stevenson's holophotal reflector, composed entirely of glass arranged at the angles of total reflection, and a complete system of lenses, lanterns, buoys, beacons, and accessory apparatus and fittings, the whole making a most interesting exhibition.

India and the colonies promise well; the show of the former is only limited by the area allotted to it, as the objects at the disposal of Dr. Forbes Watson may be said to be unlimited in number, and unrivalled by anything in the Exhibition for beauty of colour and workmanship.

The Canadian court will present a peculiar appearance; the columns of the building have been encased in woodwork, which will be made to represent trunks of trees; a transparent false ceiling will embrace the upper part of these trees, the whole being arranged, with the aid of the decorator, to represent a tent or pavilion in the forest. Within this enclosure will be a fine collection of the timber, ores, and other products of the country, including a gigantic squared yellow pine, 50 feet long, and containing 200 cubic feet of timber. Canada is one of the few colonies that will show machinery, several printing presses and other examples having been sent over. There will also be several specimens of carriage-building, including a trotting carriage of excessive lightness, called *la planche* by the French, and the "spring-board" by English Canadians; two sledges, and a railway sleeping carriage, on the American system.

The fittings and decorations of all the foreign courts are nearly completed, and, in many cases, important contributions are brought to light. One of the most conspicuous and most beautiful is a mosaic picture, of large size, in the Russian court, the design, a group of the saints of the Russian calendar, is by Professor Neff, of the Academy of the Beaux Arts of St. Petersburg; the mosaics are in enamel, and the effect of the work is extremely fine.

The Italian courts are being rapidly completed, and in that of the Papal States a magnetic meteorograph occupies a central position; this is the invention of the Reverend Father Secchi, Director of the Roman Astronomical Department.

The States of Northern, Central, and Southern America are setting out their goods; and the decorators are now finishing off the Chinese and Japanese courts in gold and vermilion, and all the brightest possible hues, the whole being in the style of the countries whose productions are to be exhibited there.

Amongst the new buildings in the Park, the Chinese has become conspicuous by its high square roof, with up-turned corners; the Pavilion of Morocco approaches completion, and has a very marked and peculiar character; while near it rises a large pyramidal building in two stages, which will contain a collection of the antiquities and products of Central America; the fine group of Egyptian buildings is now finished externally, and nearly so inside also, and they are not only striking but remarkable for their solidity and elegance; at another corner of the park a collection of Austrian buildings has sprung up with wonderful celerity. All the out-of-doors work is, in fact, as forward as the weather would permit, and the few days which intervene between this and the opening of the exhibition will doubtless produce immense changes.

The arrangements of the gallery to receive the illustrations of the History of Labour, are nearly all completed, and the contributions are arriving. The Bishop of Saint Brieuc has collected a number of the most precious objects belonging to the churches of his diocese. The authorities and amateurs of Toulouse send a large and rich collection of antiquities, of the Gallo-Roman period. Rheims sends the precious relics belonging to her cathedral; and there are many fine specimens of ancient tapestry and objects of art contributed by the museum and public library of the old city, and by private persons. The Bishop of Clermont has collected the most beautiful specimens of ecclesiastical plate and ornaments in the Puy de Dôme; and the Bishop of Limoges, the Archbishops of Sens, Arras, and Bourges, have collected similar specimens of art manufacture in their several dioceses. The local committees of the departments of the Rhône, the Nord, and the Seine Inférieure have made magnificent collections from the treasures of the churches, museums, and private collections of their districts. Amongst the most remarkable objects in the French section of this department of the exhibition will be the shrine of Saint Chauvin, considered to be the most important specimen of French goldsmith work of the latter part of the thirteenth century. The representatives of the commission at Nimes and Poitiers are said to have made a rich and rare collection. Large contributions are arriving from abroad, but it is much to be regretted, if the report be true, that Belgium and Prussia will not send anything to this section of the exhibition.

The Salle de Conférences, or lecture room, spoken of long since, is now in hand and will soon be finished.

Ten thousand French workmen and workwomen have met and elected the delegates to represent them at the exhibition; the number of representatives thus appointed

is 305 men and 10 women. Each trade or batch of trades had to elect a number of delegates in proportion to its numerical strength, thus the *ouvriers* of the coach, wheelwright, harness-making, and other allied trades named twelve representatives; the bronze founders and workers, and the cabinet makers and other workers in wood, each eight; the letter-press printers, typefounders, and stereotypers, six; the jewellers and goldsmiths, the engineers and mechanicians, the founders, turners and metal workers, the tool and nail makers, and the tanners and leather dressers, each five delegates, and the other groups numbers diminishing down to one. The ten female delegates represent the seamstresses, the stay-makers, artificial florists, the workpeople of the linen warehouses, and the dressmakers, each electing two delegates.

The Exhibition will, like its predecessors, give rise to a considerable number of publications, besides the official catalogues and handbooks. The most important yet announced is entitled "Etudes sur l'Exposition de 1867," by M. E. Lacroix, editor of the *Annales du Génie Civil*. The plan of this work is very elaborate, embracing all the subjects connected with civil engineering, construction, and scientific manufactures, and the list of contributors includes a large number of scientific writers of high standing.

M. Ch. Kerdoël, editor of the *Moniteur Vinicole*, and a practical farmer, announces a special publication on the agriculture of the Exhibition. Both these works are to be published in parts, and are announced to appear in the month of April.

The post office, telegraph office, and a number of restaurants, cafés, and other establishments for the accommodation of the public are now open, and many more will be so in a day or two. The weather is improving, and the prospects of the Exhibition improving with it.

Fine Arts.

Raphael Drawings, &c.—A series of photographs, perhaps unexampled for completeness, from the most celebrated collections, public and private, may now be consulted by students in the National Art Library, Kensington. The series comprises photographs from 90 drawings in Venice, 80 in Vienna, 54 in Windsor, 188 in Oxford, &c., &c. In fact, authentic copies of at least 600 examples of Raphael's scattered studies in ink, chalk, silver-point, and sepia, are now for the first time brought together for examination and collation. The Department of Science and Art, it is known, have for a considerable period entertained the idea of making a grand exhibition of the works of Raphael. This assemblage of photographs may do something to advance the project. The cartoons are already on the spot. "The Raphael Room" which has for some months been open, though as yet more tentative than complete, serves to indicate the mode in which the works and genius of Raphael will admit of illustration. It was a favourite idea of the late Prince Consort, that the three great Italian masters, Leonardo da Vinci, Michael Angelo, and Raphael, should receive systematic and adequate exposition. What progress had been made towards the realization of this intention at the time of Prince Albert's death, may be judged from the photographs, engravings, &c., after Raphael, which fill nearly fifty volumes now in the Queen's library, Windsor Castle; and it was by the authority and under the influence of the Prince Consort, that a large number of the photographs now seen in duplicate at Kensington, were originally executed. There was scarcely a collection, save that in the Biblioteca, Milan, not included in the series. This important collection is still unrepresented at Kensington. A trustworthy photograph from Raphael's cartoon of the "School of Athens" in Milan, would indeed be of great value.

Collection of Art Fac-Similes.—The Belgian Government has decided on adding to its Museum of Antiquities a collection of fac-similes and tracings of ancient mural painting and the most interesting stained glass in the country. As a nucleus for this new museum of art, the authorities have purchased of M. Capronnier, of Brussels, a series of 87 cartoons of the most celebrated painted windows of the churches of St. Gudule, at Brussels; St. Jaques, St. Martin, and St. Scroais, at Liège; St. Wandra, at Mons; St. Pierre, at Louvain; and of the cathedrals of Tournay and Antwerp.

Architectural Conference.—The Society of the Architects of France invite their *confrères* of all the world to an international conference, to be held in the month of July next, with the object of taking into consideration the methods in use in architectural education, and all questions connected with the subject, and especially to inquire into the tendency of the modern architecture of all nations.

Discovery of a Picture by Vandyck.—A St. Cecilia. by Vandyck, said to be one of the finest productions of the artist, and in admirable condition, has been discovered in an extraordinary manner at the village church of Caelevoet, between Uccle and Beersel, in Belgium. Repairs having been necessary, the walls of the little church were stripped, when the picture was found between two boardings.

Manufactures.

Tuscan Cotton Manufactures.—The manufacture of woven cottons for the dress of the lower classes in Tuscany causes a considerable importation of cotton thread, of which the English manufacturers have the exclusive monopoly. These fabrics, which bear in the country the name of *bordato* and *fustagno*, are made up in nearly all parts of Tuscany, but more especially in the lower valley of the Arno, at Pisa, Pondera, Navacchio, Empoli, &c. At these towns there are more than 100 hand-looms; at present none are driven by steam power. A great number besides are scattered through the country, especially where the straw hat industry fails. Women find in this employment, which allows them to attend to the cares of their household, a useful resource for their families. According to the last statistics published by the grand ducal government, the only one which makes mention of this industry, the number of existing looms in 1856 is estimated at 150,000. Since then they have increased to a considerable degree; their number may now be computed at from 175 to 180,000. The cotton employed in this industry comes, as cotton thread, direct from Manchester and Liverpool to Leghorn, where it is bought by the principal manufacturers, who have it dyed, and distribute it to the weavers, who again distribute it to those who, having no loom, are employed in winding the thread and preparing it for weaving. The work is paid by the piece, at from 7 to 9 centimes the Tuscan ell ($1\frac{3}{4}$ of this measure, is equal to a metre). The weaver can earn from 42 to 56 centimes per day. The winders are also paid by the piece, and cannot earn, working from morning to night, more than 35 to 42 centimes per day. Fabrics of this kind are sold in all the markets and fairs of Tuscany, and the price varies, according to quality, from 84 centimes the Tuscan ell to 1 franc 20 cents. All colours are employed for the fabrics intended for women's dress, deeper colours being used for men's wear—grey, deep blue, or the natural colour of the cotton. The annual manufacture is valued at more than twenty million francs, and the importation of cotton at more than eight million francs. There are at this present time, in the warehouses of Leghorn, nearly four million francs' worth of cotton thread intended for this industry, imported entirely from England. Since the slight rise in cottons, which took place recently, the weavers have abstained from making pur-

chases, in the hope of a speedy fall in price. Nevertheless, the looms are not idle at the present time, owing to the foresight of manufacturers, who, fearing competition with the factories of Northern Italy, and particularly with those mills which have just been erected in Bologna, have kept a great quantity of cotton thread in reserve. One manufacturer, M. Manetti, a very rich proprietor in the province of Pisa, employs at his factory more than 6,000 persons of both sexes—dyers, winders, and weavers.

Commerce.

Artificially Coloured Tea.—It appears, by the *Produce Markets Review*, that a complete revolution has taken place in the distribution of the Japanese crop, for whereas a few years ago the greater part went to England and China, and little more than one-fifth to the United States, the latter now monopolize nearly the whole supply. The explanation of the diminution of shipments to England is probably that the public here will not buy natural green teas, but prefer them artificially coloured with Prussian blue and gypsum. During the American war, the taste of the English public was met by sending the pure Japanese tea to China to be dyed green; but the Americans, who drink a great deal of Oolong, show great partiality for the fine-flavoured Japan teas. That Japan tea was ever sent in any considerable quantity to China, suggests the old proverb about sending coals to Newcastle. It may, as we have said, have been sent there to be coloured, but we should have thought that the Japanese, who at least equal if they do not excel the Chinese in manual dexterity, could have performed this process at home. They may do so now, for all we know: but it would be more pleasant to suppose that the Americans drink the tea in its uncoloured state.

Colonies.

Banking in Melbourne.—In the year 1856 the eight banks then existing held, on an average, coin to the amount of £2,798,257, and had notes in circulation to the extent of £,2,328,226; but, notwithstanding the increase of trade, and the development of resources then unknown, the note circulation and the stock of coin has gradually declined. The value of coin held on the 30th June, 1866, was £1,259,767, and their notes in circulation but £1,278,030, showing a decrease in the last ten years of £1,538,490 in the bank stock of coin, and of notes in circulation £1,050,236; but during this period the deposits have continued to increase. In 1856 the average amount of deposits held was £5,967,330, and in the quarter ending June, 1866, they were £8,799,962. This reduction has been going on with increased profits and capital, showing that there is no insolvency in the matter. The long drought has, doubtless, contributed to the present scarcity of money. The precise amount of loss caused by the drought is unknown, but it is estimated at about £700,000.

Notes.

Education and Crime.—Lord Chief Justice Bovill, in his charge to the grand jury at the assizes at Lewes—alluding to the remarkable distinction between the calendar for the eastern and western divisions of the county, in this respect, that few of the prisoners in the former could read and write, whereas most of those in the latter could, and that there was much less crime in the latter than the former—observed upon the great importance of education as a means of preventing crime. He remarked upon the terrible temptations to crime which were presented by idleness to ignorance. Persons unable to read, and thus shut out from a whole world of innocent entertainment, when they found themselves idle and unemployed, what were they to do? It was obvious that such persons were exposed to peculiar temptations to crime, simply for the reason that they did not know what to do with themselves when unemployed. This was peculiarly the case in agricultural districts, and it strongly showed the extreme importance of educating the children of the poor, especially of the agricultural population. He was aware of the temptation which there was to keep children from school when they were able to earn money, but this only showed the importance on the one hand of getting them to school as early as possible, and, on the other hand, of persuading them to attend evening schools, at all events on some days in the week.

Correspondence.

The Food Committee.—Sir,—I have read with great interest the papers on Food published in your journal on the 8th and 15th of March; but with reference to the extract of meat, I cannot understand how Dr. Thudichum arrives at his conclusions marked *a*, *b*, *c*. These conclusions seem to me singularly at variance with the facts of the case. 1st. As to "convenience" of use. The "extract of meat" is sold in 2 oz. pots, which may remain open, without the slightest protection, for days, and yet no change or decomposition takes place. As to loss by "sub-division," there is none whatever; the extract certainly sticks to the spoon, like treacle, but of course is all dissolved and taken up by the water used. 2nd. As to the supposed "necessity of storing in a cool larder." The sample of extract sent by me to the Committee on Food was made in New South Wales, in Nov., 1866, when the thermometer averaged 85° in the shade. It came home in the hold of a P. and O. steamer, through the Red Sea, the heat in the hold averaging over 90°.—Liebig states (Annals of Chemistry, vol. 133, p. 125, year 1865): "I have now before me samples which have been preserved 15 years in vessels stopped with a simple cork or paper, and which exhibit no sign of deterioration." So much for the necessity of a cool larder. 3rd. As to the "intelligence" required in using the extract of meat. About the same degree of intelligence is required as in making tea, perhaps hardly so much, as it is not absolutely essential that the water used should be actually boiling. The following is from a Report by Dr. Parkes, Professor of Hygiene, Army Medical School, and published by the authority of Government:—"In all our trials even small quantities produced a feeling of support and vigour which ensued very soon after it was taken. For the military surgeon it is likely to be very useful in active service, not only for the sick and wounded, but for healthy men. Its small bulk, *ease of cooking*, savoury taste, and great restorative action, would make it most useful in rapid expeditions." I may add that in Mr. Chester's remarks, published in last week's *Journal* (p. 274), he speaks of the preserved boiled beef as "Tindal's;" it should be described as produced by the "Australian Meat Company (Limited)."—I am, &c., C. G. Tindal.

MEETINGS FOR THE ENSUING WEEK.

Mon..... R. United Service Inst., 8½. Prof. W. J. Macquorn Rankine, "The Economy of Fuel, comprising Mineral Oils."
Society of Arts, 8. Cantor Lecture. Mr. John Hullah, "On Music and Musical Instruments."
Farmers' Club, 5½. Discussion on "The Desirability of a Board of Agriculture as a Government Department." Introduced by Mr. Nockolds.
Odontological, 8.
London Inst., 7. Prof. Westwood, "On Entomology."
Society of Engineers, 7½. Mr. Henry Davey, "On Pumping Engines for Town Water Supply."
Royal Inst., 2. General Monthly Meeting.
Entomological, 7.

Medical, 8.
Asiatic, 3.
Victoria Inst., 8.

TUES ...Horticultural, 3. Fruit and Floral and General Meeting.
Royal Inst., 3. Rev. G. Henslow, "On the Practical Study of Botany."
Civil Engineers, 8. Mr. W. A. Brooks, "Memoir on the River Tyne."
Pathological, 8.
Anthropological, 8.
Geologists' Assoc., 8.

WED ...Society of Arts, 8. Discussion, "How to provide Healthy and Cheap Dwellings for the Working Classes with Financial Success." Introduced by Mr. Thos. Hawksley.
Geological, 8. 1. Mr. W. Boyd Dawkins, "On the Dentition of *Rhinoceros leptorhinus*." 2. Rev. P. B. Brodie, "On the Drift of part of Warwickshire." 3. Mr. J. W. Judd, "On the Strata which form the base of the Lincolnshire Wolds."
Pharmaceutical, 8.
Obstetrical, 8.

THUR ...London Inst., 7. Prof. Bentley, "On Botany."
Royal Inst., 3. Mr. W. Pengelly, "On the Geological Evidences in Devonshire of the Antiquity of Man."
Linnæan, 8. Mr. J. G. Baker, "On the Geographical Distribution of Ferns."
Chemical, 8.
Royal Society Club, 6.
Artists and Amateurs, 8.
Royal, 8½.
Antiquaries, 8½.

FRI .....Philological, 8.
Royal Inst., 8. Mr. W. Pengelly, "On the Insulation of St. Michael's Mount, Cornwall."
Archæological Inst., 4.

SAT .....R. Botanic, 3¾.
Royal Inst., 3. Mr. W. Pengelly, "On the Antiquity of Man."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb. *Delivered on 21st March*, 1867.

68. Bills—Uniformity Act Amendment.
71. ,, Oxford and Cambridge Universities Education.
73. ,, Grand Jury (Ireland) Amendment.
129. Army (Artillery and Engineers)—Correspondence.
137. (1 to 13) Railway, &c., Bills (Parts 1 to 13)—Board of Trade Reports.

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251. (II.) East India (Military Finance)—Annual Statement.

Patents.

From Commissioners of Patents' Journal, March 22nd.

GRANTS OF PROVISIONAL PROTECTION.

Animal size, packing, &c.—607—J. C. Martin.
Baling bands, couplings for—630—A. V. Newton.
Belts, fastenings for—530—A. V. Newton.
Bituminous substances, distilling—650—W. Young and P. Brash.
Boilers—609—T. Beeley.
Bottles, &c., cases for—615—G. Withy and J. F. Cotterell.
Brackets, adjustable—618—E. Wells and W. Pryor.
Breech-loading fire-arms and cartridges—447—H. Haschke.
Breech-loading fire-arms, cartridges for—660—G. H. Daw.
Bridle bits—638—H. W. Achgelis.
Burners, regulating the supply of gas to—577—W. C. Thurgar.
Calico printing machines—628—W. Tomlinson.
Carriages—622—G. H. Morgan.
Casks, bushings for bung holes of—648—W. Hurrell.
Chains, &c.—528—J. G. Taylor.
Clockwork, winding up—532—C. E. Brooman.
Compasses, protecting the needles of—676—J. S. Gisborne.
Drying cylinders, regulating the speed of—674—A. Rupp.
Eggs, hatching—640—S. Wortley.
Fabrics, producing boarders on—585—S. Frank and R. Gooddy.
Fagots—540—T. Humphreys.
Fan blowers, actuating—646—W. Clark.
Fibrous substances, preparing—666—J. Horton, jun.
Fibrous substances, preparing, &c.—589—A. and H. Illingworth.
Fire-arms, breech-loading—594—W. R. Pape.
Fire-arms, breech-loading—599—M. A. F. Mennons.
Fire-arms, repeating breech-loading—619—G. Haseltine.
Flax stripping machines—596—W. E. Gedge.
Fluids, &c., raising, &c.—686—W. B. Nation.
Gas—624—J. Thompson.
Glove fastenings—656—J. H. Johnson.
Hook, a compound safety disengaging—573—J. C. Broadbent.
Hydro-carbon oils—641—A. S. Macrae.
Hydro-carbons, treating—563—A. A. Croll.
Inkstands—557—J. Piddington.
Insects, destroying—605—S. Newington.
Iron bands, fastening—595—T. J. Binfield.
Knobs, securing—553—T. Hyatt.
Lace—544—S. Butler.
Lamps—678—G. Glover.
Lamps, miners' safety—617—G. Rowley.
Light, artificial—556—A. G. Chalus.
Liquids, cooling and freezing—625—H. C. Ash.
Liquids, transporting, &c.—583—M. Gossi.
Locomotives, &c., indicating the speed of—581—F. W. Jones.
Locks—654—F. Pope.
Locks, &c., knobs for—664—S. Hawthorn.
Materials, conveying, &c.—620—J. R. Breckon and R. Dixon.
Metallic ores, reducing, &c.—652—S. C. Salisbury.
Mines, destroying explosive gases in—565—J. Harbert & F. Goodman.
Motive power—278—I. Baggs.
Motive-power engines—558—A. McCallum.
Mouldings, cutting, &c.—604—R. Thompson.
Needle cases—603—J. W. Lewis and G. Archbold.
Oils, utilizing—616—J. E. Duyck.
Optical illusions, producing—629—H. W. Haliett.
Ovens—562—J. Buhrer.
Porcelain—642—W. E. Newton.
Railroad carriages, starting—670—W. Clark.
Railway axles, bearings for—672—L. Tidén.
Railway signals, &c.—538—J. Saxby and J. S. Farmer.
Reel frame and thread cutters, combined—598—R. E. Keen.
Safety gauges, self-acting—591—J. A. Coffey.
Screws and bolts—550—A. V. Newton.
Sewage, treating—579—W. Parry and J. Frearson.
Sewing machines—561—E. T. Hughes.
Sewing machines—636—I. Dimock and J. Gresham.
Shirts, &c., metallic fronts for—606—J. M. Stanley.
Steam and gas engines—571—A. V. Newton.
Steam boiler furnaces—634—W. Heginbottom.
Steam boilers—626—E. Storey.
Steam boilers—662—J. Whitaker.
Steam driving wheels—536—W. Stobbs.
Steam engines and pumps—621—J. G. Tongue.
Steam, generating, &c.—601—J. Marchent and J. Parker.
Steam hammers—644—W. E. Newton.
Steering apparatus—559—A. B. Brown.
Stones, &c., crushing—680—B. Walker and J. F. A. Pflaum.
Telegraph wires, insulators for—632—G. Davies.
Tent poles—600—E. Deane.
Textile fabrics—548—M. Mackay.
Tobacco pouches—65—G. Inderwick.
Towels—513—J. and J. Cash, jun.
Truss supports—569—W. E. Newton.
Tunnels, perforating—575—T. Berrens.
Umbrellas, &c.—602—R. E. Waddington.
Vehicles, apparatus for receiving money in—554—R. E. Guy.
Wearing apparel—610—F. H. Jones.
Wheels—567—G. F. Russell.
Wheels, tyres for—668—J. Newman.
Yarn and thread, winding—682—H. C. Hill.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Fire-arms, breech-loading—798—E. L. Sturtevant.
Safety valves—794—A. S. Cameron.
Steam boilers—783—J. Robinson.
Steam engines, slide valves of—718—J. Thévenet.

PATENTS SEALED.

2452. J. Calvert.
2453. R. Kunstmann.
2454. J. and A. Gamgee.
2459. W. Hunter.
2461. C. E. Brooman.
2463. J. Barker.
2470. G. E. van Derburgh.
2474. T. B. Taylor.
2478. T. Amey.
2479. J. C. Sellars.
2540. W. Hope and H. Browning.
2930. H. A. Bonneville.
3116. A. Fournet and O. Nadaud.
3208. R. Carte.
3243. W. Richards.
3255. W. Hopkinson.
260. W. R. Landfear.

From Commissioners of Patents' Journal, March 26th.

PATENTS SEALED.

2492. W. R. Corson.
2498. J. E. Thibault.
2500. G. Slater.
2504. F. W. C. Dromtra.
2506. J. and J. Broughton.
2511. S. Price.
2516. D. Imhof.
2520. W. la Penotière.
2521. W. Clark.
2524. J. Chalmers.
2534. D. Barker.
2557. G. E. Donisthorpe.
2559. J. H. Johnson.
2586. J. Robertson.
2991. H. Lampson.
76. J. Howard & E. T. Bousfield.
102. H. A. Bonneville.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

711. J. Reilly.
807. E. Stott.
725. W. Howe.
726. D. H. Barber.
718. J. Bennie, jun.
719. J. and J. Lawson, jun.
721. J. Leslie.
950. W. Clark.
971. W. E. Gedge.

PATENT ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

723. J. Aspell, E. Booth, & J. Hurst.
734. W. Spence.
810. I. Holden.
755. C. Ashworth.

Journal of the Society of Arts.

FRIDAY, APRIL 5, 1867.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'Clock :—

April 10.—"On the Operation of the Chain Cables and Anchors Act, 1864." By Robert Galloway, Esq., C.E., Chief Surveyor of Steam Ships and Examiner of Engineers, and Inspector of Proving Establishments, Apparatus, and Machinery.

April 17.—*Passion Week.* No Meeting.

Cantor Lectures.

The next Lecture of the Course, "On Music and Musical Instruments," by John Hullah, Esq., will be delivered as follows :—

Lecture VI.—Monday, April 8.

Musical Instruments (*continued*).—Mediæval Instruments, &c.

Mr. Hullah having found it impossible to deal with so extensive a subject as musical instruments in the two lectures originally assigned to it, it is proposed to extend the course by one or possibly two lectures. Particulars will be duly announced.

The lectures commence at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend.

Final Examinations.

Owing to the death of the Dean of Hereford, Examiner in Domestic Economy, and to the resignation of Mr. John Marshall, F.R.S., Examiner in Animal Physiology, the Council have appointed Examiners as follows :—

Domestic Economy ..	E. Carleton Tufnell, Esq., one of Her Majesty's Inspectors of Schools.
Animal Physiology ..	Michael Foster, Esq., M.D., Teacher of Practical Physiology in University College, London.

Subscriptions.

The Lady-day subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Food Committee.

The following letter was addressed, by desire of the Committee, to the Secretary of State for the Home Department :—

18th January, 1867.

Sir,—The Society for the Encouragement of Arts, Manufactures, and Commerce, having had its attention directed to statements put forth under the authority of the Privy Council and the Poor Law Board, to the effect that the working classes of this country are insufficiently fed, has appointed a committee to inquire and report on this subject with a view to ascertain how far the existing supplies may be better utilised, and how far they may be supplemented from new sources; and from such an enquiry it seems impossible to exclude the question, how far the law is effectual to prevent or to punish the fraudulent adulteration of food and the use of false measures and weights in the sale of food.

The newspapers have lately been drawing attention to numerous convictions which are stated to have been obtained in the metropolitan parishes against publicans, butchers, bakers, grocers, and other vendors of food, for having used false weights and measures; and the Society of Arts' Committee on the Food of the People would esteem it a great favour and an important assistance in their difficult work if you would have the kindness to give directions that they may be furnished with returns showing the number of convictions that have been obtained in respect of such offences in the several parishes of the metropolis within a certain definite period (say) the year 1866. The names of the offenders are not asked for, but merely a return showing the number of the convictions, the nature of the offences, and the punishment awarded, in the several parishes of the metropolis.

I have the honour to be, sir,
Your obedient servant,
P. Le Neve Foster.
Secretary.

The Right Hon. Spencer H. Walpole, M.P., one of Her Majesty's Principal Secretaries of State.

To this the following reply has been received :—

Whitehall, March 29th, 1867.

Sir,—I am directed by Mr. Secretary Walpole to inform you, with reference to your letter of the 18th January last, that application has been made to the vestry clerks of the several parishes in the metropolis for returns of convictions in their respective parishes for using false weights and measures; and I am to transmit to you, herewith, for the information of the committee of the Society of Arts on the Food of the People, the returns which have been received from such of the vestry clerks as have not objected to furnish the information desired by the Society of Arts.

I am, Sir,
Your obedient servant,
Belmore.

The Secretary to the Society of Arts.

The returns referred to will be laid before the Committee, and the substance of them will appear in a future number of the *Journal*.

The following letter has been addressed to the Secretary of State for Foreign Affairs :—

30th March, 1867.

My Lord,—The Society of Arts has appointed a Committee on the food of the people, the particulars of which are explained by the enclosed printed paper.

The Committee are about to take up that part of their investigation which relates to the adulteration of food,

and they are anxious to learn what regulations or laws are in force under this head in other countries, and how far they are found effective; and I am directed to ask if your Lordship would, through Her Majesty's representatives abroad, procure for the use of this Committee information in illustration of the provisions, action, and effect of the laws against frauds, by adulteration, or by the use of false weights and measures in the sale of food, in France, Belgium, Holland, Switzerland, Denmark, Norway, and Sweden, Prussia, and the United States.

I have the honour to be, my Lord,
Your Lordship's most obedient servant,
P. Le Neve Foster.
Secretary.

To the Right Hon. The Lord Stanley, M.P.,
Her Majesty's Principal Secretary of
State for Foreign Affairs.

The following reply has been received:—

Foreign Office, April 2, 1867.

Sir,—I am directed by Lord Stanley to acknowledge the receipt of your letter of the 30th ultimo, and to state to you that his Lordship will be happy to instruct Her Majesty's Representatives in the countries therein designated to endeavour to procure for the use of the Society of Arts the desired information in regard to existing laws on the subject of frauds and adulteration in articles of food. I am, Sir,

Your most obedient humble servant,
G. Hammond.

P. Le Neve Foster, Esq.

Cantor Lectures.

"On Music and Musical Instruments." By John Hullah, Esq.

Lecture V.—Monday, April 1.

Musical Instruments.

In his fifth lecture Mr. Hullah entered on the consideration of musical instruments. He said that were he to ask any musically-cultivated member of his audience how many instruments, differing so much from one another as to have been thought worthy of different names, there was any authentic account of, he would probably answer—perhaps as many as fifty. In a list which had recently come under his eye, he (Mr. Hullah) had found that, inclusive of acoustical apparatus, the number amounted to about 400; and this list was probably not complete. This statement would hardly be so surprising as another—that all these instruments, of whatever nation, age, or material, were reducible to two—the wind instrument, and the instrument of percussion—the pipe and the string. The motion which results in what is called sound, must be communicated to the air in one of two ways—by setting in vibration either a column of enclosed air, or some other more palpable, yet still elastic body. Indeed, perhaps, in strictness of of speech, there is but one instrument; for the column of air in a pipe is just as much set in vibration by percussion as is a string, a sheet of parchment, or a metal plate; but the modes of percussing a column of air, and any other elastic body, are so different as to render the common division of musical instruments indispensable. Of both divisions there are two distinct families; those in which varieties of pitch are produced by multiplication of pipes, strings, or other vibrating portions, and those in which varieties of pitch are produced from some one or more pipes (generally only one) or strings (generally more than one). Of the first family, the type among wind instruments is the mouth-organ, or pipe of Pan; and among stringed instruments, the harp. Of the second family, the type, among wind instruments, is the flute-à-bec; and amongst stringed instruments, the guitar. Pipes, as well as strings, have been made of various materials, vegetable, mineral, and even animal. Thus, pipes are made of wood, metal, crystal, and bone; and strings of flax, metal, silk, and catgut. Other instruments of percussion, of a lower type, are made of wood, dried vegetables, and skins. Before describing the modes, which were very few, of setting these instruments in vibration, Mr. Hullah would be glad to remove a very common misconception as to the causes of sound in them. The *voice* of an instrument is the air vibrating inside it, not the instrument itself, which latter simply contains and shapes the air, thereby enabling it to vibrate. The vibration causes the sound, which the instrument augments, and enables us to govern. This fact enables us to distinguish the two classes of instrument very decidedly. In many wind instruments the principal vibrating body is the air inside them, which is acted upon directly by the human breath; while, in an instrument of percussion, we have the string to set in vibration before we can move the air contained in the body of the instrument. A wind instrument has generally two constituent parts—a pipe, or sounding-board, and the air in it. A stringed instrument has three—a sounding-board, the air in it, and strings. In producing sound from a stringed instrument, therefore, we have one more step to make than in producing sound from a wind instrument; and this is one of many reasons for thinking wind instruments the more ancient of the two. But, whichever be the more ancient, both are of immense antiquity; as, indeed, are all essentially different modes of producing musical sound. A really new quality of sound has not been invented for ages. Improvements in the strength or sweetness of these qualities have been and still may be made; but, whether the oboe reed be an inch or an eighth of an inch wide, whether the flute have two holes or ten keys, the instruments are essentially the same now as they were three thousand years ago. Though no record of the order in which the primæval instruments came into being has reached us, it is not difficult to indicate what this order is likely to have been. The craving for rhythm is stronger in all of us than that for time. Monotonous sounds, iterated in an orderly manner, are more easily appreciated and remembered than sounds, in themselves more musical, whose lengths bear no proportion to one another. If this be so, monotonous or pulsile instruments must be prior to, and therefore more numerous than, all others. The number and variety of these instruments in the world is incalculable. Pipes probably followed these varieties of the drum, and pipes hardly more worthy than the drum to be called instruments. For, in its primitive state, every pipe has but one note. The production of several notes from the same pipe, like the production of several notes from the same string, was obviously posterior to the obtaining the same effect by the collocation of several pipes or strings of different dimensions. The mouth organ therefore is likely to be anterior to the typical flute, or oboe, whatever their forms may have been. The earliest stringed instrument is probably the bow; not the bow of the modern violinist, which is but a part of an instrument, but the bow of the ancient hunter and warrior. The bow-string, under favourable circumstances, gives an audible sound. The resemblance between the bow and the earliest harps certainly tends to verify the origin, not in itself improbable, thus assigned to stringed instruments. A slight thickening of the outline at one part is all that distinguishes the latter from the bow. This thickening marks the place of the sounding-board, the invention of which, like that of the line in musical notation, constitutes the first step in a long and most profitable journey. Most nations seem to have long had some instrument of the dulcimer kind, formed of strings of different length and thickness stretched over a sounding-board. These strings were sometimes plucked by the finger-nail, a quill, or a piece of ivory, sometimes they were struck by hammers held in each hand. In the former case we have the type of the harpsichord, in the latter that of its successor, the

pianoforte. Next to the sounding-board the most important invention ever applied to musical instruments was the finger-board, without which we should, to this hour, have wanted the whole family of bowed-stringed instruments. The knowledge of the division into aliquot parts of a musical string, implied in the application of the finger-board, argues a very high civilization. Such is what might seem to have been the natural order or course of discovery and improvement in musical instruments. Its probability is confirmed by history and historical monuments. Assyrian and even Greek instruments are chiefly known to us from pictorial or plastic representation; but we have not only representations of ancient Egyptian instruments, but some specimens of the instruments themselves. The Egyptian flutes which have been found are of wood; probably the earliest were made of bone. The Latin word *tibia* was applied generally to pipes not commonly made of metal. The Egyptian flutes were generally very long, and sometimes double. In Greek and Roman music, flutes played a most prominent part. They were made of box, of laurel wood, and even of brass, silver, and gold. Flutes were employed by the Greeks and Romans, not only as concert instruments, but to maintain the pitch of the voice in public oratory and theatrical representation. All recitation among the cultivated ancients would seem to have been musical. The enormous theatres, the vast public places of Greece and Rome, like the churches of the middle ages, were of dimensions altogether beyond the powers of the speaking, or so-called natural voice. Whatever associations there may now be with the monotone (the basis of musical oratory), its adoption originated in considerations thoroughly practical. All but the most practised orators, musical or unmusical, occasionally depress or elevate their voices too much; the ancients met this propensity by stationing near the orator a *tibicen*, or flute-player, who from time to time reminded him of the true oratorical pitch. In all Greek and Roman representations the tibicen plays on a double flute. It has been supposed that these instruments were often in octaves one with another; and the words *pares* and *impares*, applied by Terrence to flutes, have been thought to justify this supposition. The words *dextræ* and *sinistræ*, used by the same author, would seem to refer to the hands by which each flute was sometimes held. It is not improbable that the larger flute was one-noted (a drone), while the smaller was pierced, and capable of something like execution. The Egyptian boatmen still use a double flute; and in India there is an instrument of this class blown, not by the mouth, but by the nose. But there is another class of instrument, the pipes of which are generally of wood, like those of the flute, but the sound of which is produced in a very different way. In both the cause of sound is the vibration of the column of air contained in the pipe, but whereas the tone of flute pipes is produced by a comparatively direct action of the breath on this column of air, that of reed-pipes, as they are called, demands the intermediate agency of a tongue, or a pair of tongues, of some elastic material, the vibration and beating together of which afterwards sets the column of air in the pipe in vibration. That which a string is to a sounding-board a reed is to a pipe. Dr. Burney, writing in the last century, thought that the ancients were unacquainted with the reed; but in some pipes from Egypt, in the British Museum, there are pieces of thick straw, or similar material, which a recent writer, Mr. Engel, thinks served for a similar purpose as the so-called reed in our oboe or clarionet. Indeed it is difficult to understand how, without a reed, a tube blown from the end, in the manner depicted on ancient monuments, could be made to sound. Of brass instruments, the type, the trumpet, is very ancient. As flutes, generally of wood, were sometimes made of metal, so trumpets, generally of brass, were sometimes made of other material. Hebrew trumpets, for instance, were rams' horns. The oldest representations give the trumpet, not as with us, doubly reversed, but straight, or very slightly curved. In processions trumpets thus made, being too heavy for the performer to support, were rested on the shoulders of other persons, and in stationary performances on a frame. There are three modes of setting in vibration a musical string, and the result of each is the production, even from the same string, of very different qualities of sound. These modes are plucking or pulling it with the finger, the finger-nail, a quill or a piece of bone; striking it with some kind of hammer; and abrading or rubbing it with a bow. With the first two of these modes the ancients were acquainted; of the bow it is probable that they had no knowledge; it is certain that they did not turn it to account. Of the plucked instruments the types are the harp, and the cithara or guitar. The lyre, through different in form from the harp, is but a variety of it. The cithara, identical in principle, and even name, with the guitar, is a very different instrument from the harp or lyre; and though, in the hands of the ancients who did not use the bow, it remained very inferior to the harp, yet its construction indicates greater mathematical science if not greater mechanical skill, and an admirable economy of means and appliances. Moreover its finger board was in very early times, it is believed, *fretted*; showing that the harmonic division of a string was understood. But it is as the founder of the violin-family that the cithara is most interesting to us. Many were the modifications needed to develope the cithara into the violin, yet no one would for a moment question their relationship. The harp, however, as it was the most perfect, was the most honoured of very ancient instruments. Numerous representations, both of Assyrian and Egyptian harps, have been found; and they, the latter especially, argue not only great mechanical skill and considerable musical science, but the power of producing music which it is likely might have been considered pleasing and effective even by us Europeans of the nineteenth century. Not so with the Greeks, who never adopted the harp. The trigonon, an inferior harp, and the lyre, were in use among them; but, with a single possible exception, there is not a Greek monument extant including any representation of a harp. What sort of music, in our sense of the word, could have been got out of the lyre it is not difficult to imagine. But the music of the Greeks was altogether another art from ours. They, of course, originally received all their arts from nations older in civilization than themselves, and their aim and object would seem always to have been to simplify them. The same craving for what is called the chaste in art, which led the Greeks to the substitution of the lintel for the arch, and the repetition of the severe forms with which we are all so familiar for the intricate outlines and variegated surfaces of Asiatic architecture, would naturally induce the rejection, as barbarous, of an art so nearly akin to these latter—poliphonic or part-music. The lyre is not of Greek invention; it was known both in Assyria and Egypt. Of instruments known to us chiefly through representations, it is not extraordinary that we should have recovered little about the musical construction or methods of tuning. Mr. Carl Engel, to whose works on ancient music Mr. Hullah had more than once referred, has made some ingenious suggestions on this subject. He thinks that many ancient instruments were tuned to a scale of only five sounds; and his conjecture is supported by the fact that many do consist only of five, or twice or thrice five strings. The "instrument of ten strings" of our translation of the Psalms of David will of course come into everyone's recollection. Seven strings, the number found in some ancient instruments, might have been tuned very efficiently in the Greek order of *conjunct* tetrachords. No succession of so few sounds as the last could possibly be contrived out of which such a variety of agreeable melody can be got. The presence of the lower leading note gives it a great advantage over our scale, while the absence of the tritone makes it much easier to sing. Moreover, it includes the third from the tonic (as we should call it), which decides its mode as

major. A great number of popular tunes are contained within the compass of two conjunct Greek tetrachords, among them our National Anthem. The lecture was illustrated by a large number of drawings of ancient instruments, and some specimens of oriental reed pipes.

Seventeenth Ordinary Meeting.

Wednesday, April 3rd, 1867; The Earl of Shaftesbury, K.G., in the Chair.

The following candidates were proposed for election as members of the Society:—

Brown, Thomas P., 24, Surrey-street, Strand, W.C.
Despointes, F., 11, St. Luke's-road, Westbourne-park, W.
Jones, Sir Willoughby, Bart., Cranmer-hall, Fakenham.
Roe, Charles Wm., Padmore-villa, Sunny-bank, South Norwood, S., and 37, Moorgate-street, E.C.

The following candidates were balloted for, and duly elected members of the Society:—

Folliott, William, 12, Idmiston-villas, Forest-gate, S.E.
Lewis, R., 18, St. James's-street, S.W.
McCall, J., C.E., 137, Houndsditch, N.E.

The subject introduced for discussion was—

SUGGESTIONS FOR A MODE OF SUPPLYING CHEAP AND HEALTHY DWELLINGS FOR THE WORKING CLASSES, WITH SECURITY AND PROFIT TO THE INVESTOR.

By Thos. Hawksley, Esq., M.D., Lond.

Before describing the method of providing suitable dwellings for the working classes which I am desirous of submitting to your consideration, I will beg to premise, as briefly as possible, a few observations on what appear to me the faults of our system in dealing with the requirements of the poor, and I regret that the time usually allotted to communications of this kind will not allow me to refer much to the authorities and the exact data on which my argument is founded.

We know that a considerable portion of the community in our country suffers under the difficulties of poverty, difficulties connected with bad and to them expensive dwelling accommodation, dear and adulterated food, impure water, foul air, insufficient clothing, firing, and want of education. To the persons so circumstanced life is a struggle from birth to death. In the conflict, from 17 to 27 per cent. of their infants perish within the first few months of their introduction to a world to them so hard and cruel. The children who survive these first rude assaults grow up pale, weak, and old before they are young, so little do they see of the play and sunshine appropriate to infant years. Many die early of scrofula or consumption, or, if they become men and women, they die on an average at half the age of others, having in that time lived the life of drudges, amid the unwholesome and wretched conditions that support and propagate the long list of preventible diseases.

A careful study of the census tables under the heads of the occupations of the people gives a strong support to the belief that, while the educated and trained members of the community are as one only, the numbers of the uneducated and the ill-trained are as many, at least, as three; so that, in a population of 20 millions, there are three-fourths, or 15 millions, predisposed, for want of the protection and the aid afforded by education and training, to gravitate into that substratum of society—the poor, or the pauper class. We know that the numbers of the latter, or pauper class, are equal to $\frac{1}{20}$th of the whole community; and, judging from the distress in the east of London and elsewhere whenever some unusual strain is put on the poorer population by pestilence, disturbed industry, or severe weather—(on the last occasion—the frost in January—in the east of London alone, 100,000 sufferers were relieved); judging, also, from the ascertained fact that, of every seven or eight deaths occurring in London, one takes place on a bed provided by charity; and again, from the enormous machinery employed to relieve poverty, which in the metropolis distributes some two millions sterling for the relief of the bodily wants of the poor, irrespective of the amounts employed in education and religion in their behalf, and independent, too, of the £900,000 and upwards expended from the poor-rates; judging from these evidences, there can be no doubt that, at least, three or four of the poor exist to every completed pauper. Some of those best qualified to judge believe that in the metropolis there are half a million of poor, struggling between pauperism and self-dependence.

If we ask what evil influences are at work to produce and maintain this large amount of misery and destitution in the midst of the richest and most humane people (judging by their charities) in the world, the reply must be that it proceeds from two principal sources: the first is ignorance, or the want of that education and training which make men and women competent and valuable to their employers, in consequence of which the rewards of their labour—their wages—are much less than they might be, and also the ignorance which leads them to adopt bad hygienic management, and to prepare their food badly and wastefully. The second great sources of evil to them are the conditions so unfavourable to health by which they are surrounded, and to which their poverty binds them helplessly—the crowded, unhealthy, and wretched character of the only dwellings they can get, with their deficient light, their bad drainage, and the decomposing filth within or around them—conditions which afford the necessary elements for the germination, the growth, and the propagation of the preventible diseases, such as typhus, typhoid, relapsing and remittent fevers, scarlatina, measles, cholera, and, from the lowered vitality produced by such dwellings, scrofula and consumption.

It should be known by those whose happier state in life preserves them from these unwholesome conditions, which act as fever-nests and hotbeds for nursing those preventible diseases, that the seeds of these diseases thus abundantly produced steal beyond the locality of their production, and enter the comfortable houses of the middle classes and the mansions of the rich, where, though they find fewer victims, they are wont to deal more deadly influence on those they find, as if the constitutions unused to the destructive influence of poisonous agents felt them more than those constitutions which had established a degree of tolerance—just as it is found that chloroform is often more deadly to the healthy than the diseased. And surely, when we mourn the loss of some valuable life in the upper or middle classes, cut off by one of those diseases, which had its origin in neglect and indifference to the sanitary conditions of the poor, we may feel it to be like the stroke of an avenging Providence.

Thus we find that a variety of the most powerful arguments combine to demand—not only on the ground of prudence and foresight, but also on that of common humanity, and of solemn responsibility before God, that we should remove these heavy burdens from the poor, and give to them a fair field for the fulfilment of their duties.

We have seen that, almost fabulous in amount as are the charities of England, and of the metropolis in particular; necessary and good in their way as are our workhouses, hospitals, asylums, and relief associations; after all they only *relieve* the evils of pauperism and destitution *after* the fact—they cannot and do not in any way come *before* and *prevent* those evils. Their increased number and extent are, in fact, a measure of the increased and increasing evil of pauperism, and their employment under a right system should be looked upon as a temporary palliative, while the true and really useful work of *preventing* pauperism is getting into operation,

and producing its fruits. Every student of human nature knows that before a man can accept alms and doles, his self-respect and self-help are gone, and he is apt to become the careless, idle, servile, and hypocritical object so extensively produced by our workhouse system.

On the other hand, if we adopt a system that does not pauperize, but treats the poor man with respect, and simply makes it possible that the wages of his honest labour shall be able to command the decent and comfortable requirements of life—that his home may be bright and cheerful, and not so wretched that perforce he is driven to the public-house—that the health of himself and family is not so constantly oppressed by heaviness, langour, and weakness, that all hope and enterprise are taken out of him, and that, instead, he is able to look forward hopefully, and to be possessed of an incentive to progress—that his children can be educated and trained by means at his command, and that he is not obliged to leave them to run wild in the streets, to become thieves and vagabonds—then we may hope to find, year by year, that our poor rates are reduced in amount, our workhouses less and less occupied, the mortality and sickness much diminished, and the general prosperity and happiness increased.

In the laws of nature, all things work together for good, and nowhere do we find an example of a law designed to accomplish some useful end counteracting its intention by producing in its action some other evil. It is the same with really wise human laws; the only proof that they are so is to be found in the fact that they move harmoniously with the general good, and in repairing one injustice do not make another.

In the instance before us, we desire to relieve our suffering fellow-creatures from the oppression of diseases which afflict them ten times more than the rest of the community;* and we are anxious to know that the habitations they can afford to rent are fit for human beings to live in.

To obtain these results on one system of management, —that of *relief*—we expend in the metropolis alone, in all probability, at least three millions per annum, independently of the immense sums given in private charity; but we have made no advance. The *Times*, in a leading article in last January, says, "To any one who was ignorant of the organization of the metropolis, it would seem as if there was no provision whatever for the relief of the London poor."

Dr. Farr, in the supplement to the 25th annual report of the Registrar-General, 1864, says that the loss of life in 30 large town districts, comprising St. Giles's, East London, St. George's-in-the-East, St. Saviour's, St. Olave's, and St. George's, Southwark, and others mentioned, equalled on an average in the ten years, 1851—60, 71,194 annually; but the proper number for the same population in a healthy district would have been only 38,459. There was consequently in these 30 districts an annual sacrifice of life amounting to 32,735; which, as Dr. Farr says, "may be justly ascribed to the unfavourable sanitary conditions in which the people live and die."

In the same supplement, Dr. Farr says that at the age from 45 to 55, the mortality of London men is double that of men in the healthy districts.

These impressive facts enable us to understand the enormous pecuniary cost sustained in England by the loss of labour and the sickness from preventible diseases. That cost has been estimated for England and Wales, to be equivalent to over thirty-two millions sterling per annum, and for the metropolis alone to nearly five millions per annum.

By another system, that of prevention, by removing the causes of preventible disease and by education, we may find that we not only attain our ends and cure the destitution and misery that are so wide spread and so injurious to all classes, but we may find that the system is self-supporting, and that in this instance as in others, *the right method is inexpensive, and the wrong one very costly.*

The great evil of unfit and insufficient habitations for the poor and labouring classes, has been greatly on the increase of late years, and now, from the railways advancing their termini into the centre of the metropolis, the formation of metropolitan railways, and the taking up new ground for other public improvements, as for the building of the law courts, the difficulties have been immensely increased. Within the last quarter of a century, several associations and individuals actuated by a noble philantrophy have stood forward to do battle with this great cause of wrong and oppression.

The first on the list is the Metropolitan Association for improving the Dwellings of the Industrial Classes, offices, 19, Coleman-street, City. This institution was founded in 1841. From its last report we learn that it has ten metropolitan establishments, which lodge a population of 2,572 persons. The average mortality of this population was a fraction over 17 per thousand. The dividend for distribution to the shareholders after paying all demands and providing for all contingencies, was 3½ per cent.

The second is the Association for Improving the Condition of the Labouring Classes; offices, 21 and 22, Exeter Hall. This was founded in 1844, and has pursued a very active and useful career. It now lodges about 1,625 persons in eight London establishments. The mortality in this population for the last four years, like the former, has been a fraction over 17 per thousand. The dividend divisible as net profit on the dwellings (separating the baths and wash-houses from the calculation) is 5 per cent.

The third association is the London Labourers' Dwellings Society; offices, 3, Charlotte-row, Mansion-house. This has paid 5 per cent. from its formation, after setting apart a sum sufficient to provide for the redemption of the leasehold property. Particulars are not given in the report received of the population or rate of mortality.

The fourth is the Improved Industrial Dwellings Company, limited; offices, Carpenters' Hall, London Wall. From the experience of its working up to the present time, the directors believe that a minimum dividend of 5 per cent. per annum may be relied upon.

The fifth are the houses erected by Mr. W. E. Hilliard, in one of the worst districts in London, that of Shadwell. Mr. Hilliard first built twenty houses on this property, on the general plan of the model cottages of the late Prince Consort. Each house containing four dwellings, cost £487 to build. After an allowance for ground rent and all other expenses, the return has yielded a clear 6 per cent. per annum; and so satisfactory were the whole results that Mr. Hilliard determined to build more of these houses sufficient to accommodate 108 families.

There are also the model buildings erected by the late Prince Consort, those of the great Peabody benefaction, and others by Miss Burdett Coutts, all of which have been erected with less regard to any commercial success than to the purely benevolent one, and therefore they do not furnish the same kind of experience on that head. But from all, we learn the same reports of improved health and morals, and of diminished mortality.

Mr. Glover, the Superintending Medical Inspector of the General Board of Health, in his report, dated January 20th, 1855, says:—"Some of these (Mr. Hilliard's) houses have been occupied nearly three years, and the average population during that period has been 450. Among this number of inhabitants, congregated in one of the worst localities of the metropolis, a large portion of them being children, it is gratifying to find that there

* Of upwards of 18,000 deaths from cholera which occurred in London, in 1849, it was found that they were in the following relative proportions:—

Of the gentry	2·6	per cent.
,, tradesmen	15·7	,,
,, mechanics	81·7	,,

has been a considerable diminution, if not an almost total absence, of epidemic* disease. There has not been a single death from cholera or diarrhœa in any of the houses." Again, he says:—"The erection of these Albert-cottages, provided with arrangements essential to health, comfort, and morals, is producing the happiest results in the neighbourhood. Tenants have become sensible of the discomfort and evils of their unwholesome dwellings."

Mr. Henry Roberts,† speaking of the model lodgings and dwellings generally, says:—"But not only has the improvement in the physical condition of the occupants of these houses answered the most sanguine expectations of their founders, but it is still more gratifying to know that moral improvement has been made. The intemperate have become sober, and the disorderly well-conducted, since their residence in these healthful and peaceful abodes. No charge of crime, nor complaint of disturbance, has been lodged at any police-station against a resident in these dwellings. The neighbourhood in which many of the houses are situated has also participated in their ameliorating influence. They appear to act as silent monitors, reproving disorder and encouraging cleanliness and propriety."

The superintendent of one of the establishments says:—"The nocturnal uproars in the adjoining streets, which constantly disturbed the inmates when first the houses were opened, gradually diminished, and finally ceased altogether."

The diminution in the rate of mortality in these improved dwellings is much greater than might have been expected, when we consider that the real difference is not as 17 to 24 (the ordinary general rate of the metropolis), but, seeing that the diminished rate has occurred amidst the most unhealthy parts of the town, the difference cannot be less than that of 17 to 33. This saving of life implies much. It tells us of increased fitness for work and exertion, of hours and days saved from suffering and from loss.

> "Dread to the poor the least suspense of health,
> Their hands their friends, their labour all their wealth.
> Let the wheel rest from toil a single sun,
> And all the humble clockwork is undone.
> The custom lost, the drain upon the hoard,
> The debt that sweeps the fragment from the board.
> How mark the hunger round thee, and be brave!
> Foresee thy orphans, and not fear the grave!"

It tells of much pain and anguish prevented, of many children preserved to fulfil the purposes of their being; of parents saved to be their guardians and protectors! It tells of a small portion saved of that four or five millions of money wasted in the metropolis by the existence of so much preventible disease. God speed therefore the noble work of the philanthropists and patriots who manage these invaluable institutions; they merit the gratitude of their country as the pioneers of the most pressing and important reform affecting the welfare of the bulk of the people; and not only for what they have effected, but for what they have taught us.

Unfortunately, great and valuable as the amount of work done by them is, it is but a very small portion of that which remains. There are, possibly, eight or ten thousand poor well lodged in these improved dwellings; but the lowest estimate indicates that improved dwellings are wanted for 200,000 persons at least, and it is not likely that these associations will be able either to provide for so many, or to provide them on a scale sufficiently cheap for the poor, and yet sufficiently remunerative to the public to attract the investment of money for the purpose. The Prince Consort said to Mr. Henry Roberts, the honorary architect of the Association for Improving the Condition of the Labouring Classes, "Mr. Roberts, unless we can get seven or eight per cent., we shall not succeed in inducing builders to invest their capital in such houses." This observation exactly hits the truth; as a commercial speculation the work would not spread and be successful with only five or six per cent. returns.

Another obstacle that opposes their success, is the difficulty of obtaining the property which, by its unfitness, has become a source of evil, and which it is necessary to improve or to clear away, and replace by suitable dwellings. Such property is often possessed by persons who have no regard for their fellow-men, and consider only the money to be screwed out of them, by providing them with lodgings which cost little or nothing to keep in order, and for which they obtain the same rent as those supplied by the associations, with every comfort. By this unprincipled course, such property may pay from 20 to 30 per cent., and by the humane and honest one only 5 or 6. It is not wonderful, therefore, that great opposition is often experienced in effecting the reforms necessary.

The societies have also experienced difficulties, for example, in being able to obtain only one side of a street, when the improvements would be impracticable without possessing both sides. Sometimes the property was in Chancery; or it was held by a number of persons; or unprincipled solicitors would put in every obstruction to proof of title and of sale, in order to increase costs. Sometimes the property was entailed, and burdened with a complication of claims; or part was held by some one abroad, or supposed to be dead; or the societies were met by disreputable owners with an almost vindictive demand for such outrageous prices, as made all dealing hopeless.

The Society for the Improvement of the Condition of the Labouring Classes has, in these ways, had to pay heavily for some of the property they purchased. The consequence is that the Streatham-street establishment costs £38 a head of population; the Portpool-lane, £54 a head; and the George-street lodging, £61 a head. On these conditions it is not likely that dwellings for the poor can be built to pay the 7 or 8 per cent. necessary to attract investors. Notwithstanding, this association has been able to supply some of its single rooms to the poor at as low a rental as 1s. 6d. a week, with the other results named.

Mr. McCullagh Torrens, the member for Finsbury, has just carried through its second reading a Bill, the intention of which it is impossible to praise too highly; the only questions concerning it are whether the mode it prescribes for enforcing the improvement or the rebuilding of the condemned property might be simplified and made more effectual; and whether the mode of providing the means to carry out the work might not be placed on a larger and more expansive basis.

The mode of acquiring the property, or of enforcing its improvement, under Mr. Torrens's Bill, would appear to be unnecessarily indirect and troublesome. There is

1st. The report of the officer of health, who is a parish officer, and who, failing to initiate proceedings may be called upon to do so by four householders.

2nd. The officer of health has to deliver copies of his Report to the clerk of local authority and to the clerk of Peace.

3rd. The clerk of local authority is to lay his report before the council.

4th. The clerk of the peace is to do the same before the grand jury, who will make a presentment.

5th. The clerk of the peace is to send a certified copy of his presentment from the grand jury to the clerk of the local authority.

6th. The local authority thus advised of the grand Jury's presentment, prepares plans and specifications of the required works, and the clerk gives notice to the owner of the property of the grand jury's presentment.

7th. Against this presentment the owner may appeal within 14 days.

8th. Or the owner may within three calendar months elect to do the work required, or to require the local authority to purchase the property.

* Epidemic diseases are among the preventible class.

† Vide "The Physical Condition of the Labouring Classes," by Henry Roberts, F.S.A., 21, Exeter Hall.

9th. In the latter case, if the parties do not agree between themselves as to the bargain, the local authority having delivered to the owner the valuation made by two able practical surveyers, then, if within a month of the receipt of such valuation the owner have not signified his intention to accept it, the local authority shall pay in the amount of the tender in the manner prescribed by the Land Clauses Act of 1845, and the local authority shall be at liberty to proceed with the work of improvement or demolition, as the requirements of the case may be.

10th. The property thus acquired by the local authority shall be held by it in trust for the purpose of—

a. The providing the labouring classes with suitable dwellings, by the construction of new ones, or the improvement of existing ones.

b. The opening out of closed, or partially closed, alleys or courts.

11th. Lastly, the local authority shall not possess this trust on any given property longer than for 7 years, and if during that 7 years it fails to sell, exchange, lease, or otherwise dispose of it, at the end of that time it shall escheat to the Crown in the same manner as if it were land belonging to a corporation which had no power to hold the same.

Now in a work of this kind, in which philanthropy and high principle have to take the place of personal interests, it is very desirable that the persons undertaking the trouble should be exposed to as few vexations and prolonged contests as possible; and it would also seem necessary to have the business transacted by persons and officers in a position as regards parish interests independent and impartial. The persons who most interest themselves in parish and vestry management are often personally interested in property of which the general good demands the reform.

1. The mode of acquiring the condemned property or of enforcing the improvement of it, would be rendered much more easy and effective by leaving the associations who would effect the work to obtain information of unfit premises or localities from all informants, not of course excluding the officer of health, but rather attaching the greatest importance to his information.

2. After the information received, the association should delegate its own officer to visit the place, who with the assistance of the officer of health would get up the accurate facts, and then report to his Board.

3. The association, having concluded that the case demands interference, draws up its statement, estimates, cost, &c., and then,

4. Sends a copy of its presentment to the owner of the property, and another to the Government officer appointed to control the associations.

5. The government controller not intervening, and thereby assenting to the justice of the presentment, the association next endeavours to make terms with the owner of the property for the fulfilment of the requisite improvements, and the owner objecting to come into the undertaking, the association then cites him to appear before the justice of the peace, or the tribunal appointed to try such cases, and thus all dispute might be summarily settled according to the rules of law and equity, in conformity with the Lands Clauses Act,

This method would probably save trouble and expense to all parties. It would require no parish rate to be imposed for carrying it out, and all the funds for every expense would form a part of the outlay of the associations, as they now do. The work would be pursued with a single eye to the public good without the impediments of local influence; and this mode would be specially advantageous as obviating the necessity of selling the property within seven years, and so avoiding the risk of its falling back into the bad state and management of its previous owner.

The following conditions are laid down as necessary:—

1. The removal of all the existing foci of disease, and the unsuitable poor dwellings, and their replacement by healthy ones appropriate for artizans and labourers. The improvement of those dwellings that do not require demolition, and the opening out closed courts and confined spaces.*

2. That the rent to be paid by the occupiers of the proposed dwellings shall be on a scale adapted to the requirements of the humblest artizan or labourer, and on the other hand that the net profits on the general undertaking, shall secure a minimum five per cent. dividend on the capital paid up.

The first condition will require for its fulfilment a large sum of money. If Mr. Torrens' estimate of one million sterling for 35,000 habitations be correct, which is about £28 10s. a head, it must require at least seven millions to build dwellings for the smallest number believed to require them? Does it not seem better that the supply of means should be of an elastic character, capable of accommodating itself to the requirements, whatever they may prove to be, rather than to shut up the work in a defined and inadequate sum? But as the work will not pay the highest interest necessary to attract this capital as an *ordinary* adventure, (the 7 or 8 per cent. laid down by the Prince Consort) what is required is to make it so desirable that some of the immense wealth of this country, waiting for investment, may be attracted to it. It is presumed that if the government would guarantee a minimum of 4 per cent. interest on such investments, the object would be immediately attained. To the public desiring a safe investment for their money it would be a great boon, for their property would be as safe as in Consols; and while tolerably certain to receive an interest of not less than 5 per cent., the government would be responsible for the minimum of 4 per cent. The debenture certificates of the associations would be easily negociable; and there can be no doubt that, in these days of commercial imposture and dishonesty, the demand for such a safe and desirable mode of investment would be greater than the supply. But what objections might the government be supposed to interpose? As to want of precedent, it may be replied that in India, the government has thought fit to guarantee the railways. In England, if there be no precedent, it may be replied that in this instance, the claims for the boon demanded are so important and peculiar, that compliance with them is not likely to be dragged into a precedent for any object. The importance consists, as before-mentioned, in its being necessary to prevent death, disease, and misery, to an immense portion of the community, and damaged health and prosperity to all. The peculiarity is this, that in granting the boon the government accepts no risk. Every shilling of the money subscribed by the public would be invested in houses and land, the natural tendency of which is to increase in value, and which in themselves constitute the safest property in existence. The property would be managed by associations of gentlemen undertaking the work from the highest and most disinterested motives; government officers would be associated, who would be responsible to the government for the probity and the prudence of the management, and lastly, a net profit on the undertaking of not less than 5 per cent. per annum, would be insured by the following plans to be discussed under the second condition.

This second condition requires that the dwellings should be let at a rent that the humblest labourer can pay, and yet that the whole undertaking should return a profit of at least five per cent. after satisfying all claims.

Until the working classes become more prosperous by a diminution in the oppression and misery caused by

* It is not supposed or intended that the whole of condemned London is to be pulled down and rebuilt at the same time. The associations would take care that everywhere the convenience of the poor should be studied, and the work, though commenced on an extensive and comprehensive scale, would be so diffused and managed, that from the first increased instead of diminished accommodation would be provided.

preventible disease, it would seem that a very large majority of them, at the present rents, can afford to pay for one room only. Even in the rich parish of St. George's, Hanover-square, we learn from Professor Kerr's paper, read before the Institute of British Architects, that of 1,500 abodes of the poor visited in that parish, it was found that 8½ per cent. of the families only had three rooms, 28½ per cent. had two rooms, and 63 persons had one room only. In the poor parishes the inability to pay rent is greater still; and it would appear that the provision should be, that the rooms being built in compliance with the requirements of health and comfort, comprising the proper allowance of light, ventilation, water-supply, and other conveniences, the rent per room should be from 1s. 6d. to 2s. and 2s. 6d. a week. This scale, it is believed, would provide for the wants of the poorest individual or family; and there can be no doubt, with the improving action of these dwellings on the health and morals of their occupants, that very soon each family would be able to pay for three or four rooms, and in the first instance for two.

The other feature of this second condition—that the undertakings should return a clear profit of five per cent. at least on capital, is made clearly practicable by the following features of the plan:—

1st. The purchase of the property to be by *compulsory sale* and reference to an *equitable tribunal*. By this means extortionate prices would be saved, and the greatest difficulty in building for the poor cheaply would be avoided.

2nd. Advantage would be taken of the valuable experience obtained by the pioneers on the road, both in the form and arrangement of such buildings and in the materials used in their construction. For example, the architect of Mr. Alderman Waterlow's buildings (Mr. Allen) discovered a material which combines cheapness, durability, ornament, and economy of labour, and this has enabled him to erect the buildings for "The Improved Industrial Dwellings Company" at much less than the ordinary cost. Probably substitutes for brick and stone may be made cheaply on the same principle, wherever shingle can be had without much cost.

It may be found advantageous to vary the form and arrangement of the buildings according to the requirements of the neighbourhood; and it is suggested that not only would it be found profitable in some situations to make the basements into shops, as has been done in Mr. Waterlow's houses, but also that in others it might be found to pay well to convert the flat solid roof into workshops and warehouses for the use of the tradesmen in the neighbourhood, who would be able to pay a good rent for them, and so lighten the rental of the dwellings.

The writer believes that a time is coming when the refuse of houses, now so mismanaged that it is the principal cause of preventible diseases, and is also a great expense to remove—will, by good management, become a source of profit, and, at the same time, by saving the water now used in washing it into the sea, that water may then be supplied by the water companies in a continuous supply, so that the expense of cisterns and other apparatus for storing water may be done away with.

These instances are merely given as examples of the many ways in which expense may be saved in building these dwellings, and, at the same time, improving their healthfulness and comfort, and, taken in connexion with the experience of the society of which Lord Shaftesbury is the chief, that of which Lord Stanley and Alderman Waterlow are chiefs, that of Mr. Hilliard, and the London Labourers' Dwelling Society, it may be confidently affirmed that the conditions laid down for fulfilling all the requirements of these dwellings may be perfectly realised, and a profit of at least 5 per cent. secured, after satisfying all charges and contingencies. Thus the Government is called upon to give only the ægis of its protection and security to this great national and all-important work; and while accepting no risk or expense, it would confer immense benefits on the whole community as regards its prosperity, health, and morality.

In conclusion, allow me, very briefly, to sum up the positions I wish to establish. They are:—

1. That a very considerable portion of the population in this country is exposed to the risks and penalties of preventible disease, and in a degree most unequal and unjust as to the rest of the community. Also that the portion of the population referred to is constituted of the persons throughout the land who, from their ignorance and their poverty, are quite incapable of rectifying their position without the assistance of their less-oppressed fellow-countrymen.

2. That Government and society, having always recognised the duty of assistance, have generally adopted one of two systems for its fulfilment, both of which deal only with the results and effects of the evils referred to, and leave their fountain or causes unopposed. The two systems are either that of *relief*, as of visiting the sick, feeding the hungry, and clothing the naked; or that of *repression*, as by making parochial relief and workhouse management so hard and painful that none but those driven to a last resource, or whose spirit had been broken by previous experiences of their degrading influence, would apply for their aid. Of the same repressing character is an enactment which would drive out poor wretches from over-crowded lodgings, without at the same time providing better ones.

3. That these systems of dealing with the evils referred to are very costly, it having been calculated that the preventible diseases involve a loss to the country of over thirty millions sterling a year, and the relief of their destructive effects cannot be less than another cost of fifteen millions per annum.

4. That the system of *prevention* is inexpensive, for it not only diminishes more and more the production of the evils referred to, but the machinery employed in the work is, for the most part, self-supporting. Its spring of action is not the charity that gives money to relieve suffering, excellent and necessary as that is where the suffering exists; but it is the higher and broader charity which recognises in every human form a nature precious as our own in God's sight, and which would shrink from moulding that nature into the pitiable and degraded form of the pauper, but rather would treat it with respect, and seek to elevate it, by making it possible that the wages of honest labour may be able to procure the requirements of life under the conditions of health and decency.

5. That the want of a sufficient number of healthy dwellings, at a rental practicable to artizans and labourers, having been shown to be the chief cause of these evils, the principal work of the preventive system is to supply them.

6. That the associations now at work for this purpose afford a ready, convenient, and inexpensive machinery for carrying out the object to a successful issue. The results of their operations as seen in the improved prosperity, character, and in the diminished mortality of the population for whom they have found healthy dwellings, prove the correctness of their method; while the independence of the plan of parish rates, parish interference, and all new burdens, recommends it for simplicity and efficiency.

7. That this machinery, to be successful, requires two helps from Government:—

a. The compulsory power of purchasing property which can be proved to be a public nuisance, and a source of disease and immorality, but which the owner thereof neglects or refuses to improve.

b. The grant of a guarantee by the Government to the public investing in this useful and patriotic work, to the effect that a minimum interest of 4 per cent. per annum shall be its perpetual condition.

The question has long been an anxious one to the

writer, who, as physician to one of our public infirmaries for consumption, has had great practical experience of the destructive and degrading influences on body and mind of the unfit dwellings of the labouring classes, and he hails with thankfulness the good step taken by Mr. McCullagh Torrens. He hopes, however, that the suggestions herein offered may receive a thoughtful and serious consideration, with a view to the modification of Mr. Torrens' Bill in order to meet them.

DISCUSSION.

Mr. Edwin Chadwick, C.B., said that, at a time when large extensions were contemplated of healthy homes for the labouring classes, it was proper to call attention to the fact that the common constructions were not healthy to the extent that was practicable. The improvements in the removal of the sewage, and of the decaying animal and vegetable matter, were now pretty well understood, and sometimes sufficiently well accomplished, with the result of the reduction of the sickness and death-rates by one-third in common constructions. But another important desideratum was to prevent damp and foul deposit, and the retention of noxious miasma, and to ensure complete dryness and purity in the common wall. On occasions of extraordinary epidemics, all experience showed how long fœtid and noxious smells were retained by absorbent walls. In cases where the authorities had been prevented by obstinate landlords, or other causes, from properly cleansing and scraping such walls, when, after a time, new inmates occupied the premises, it was observed that, in the houses that had been successfully defended against the wall cleansing, and in those alone, fever had broken out again amongst the new occupiers, thus demonstrating the deleterious influence of the foul absorbent walls. In hospitals, where the cleansing of the walls had been too long neglected, instances occurred where every man engaged in scraping and cleansing them had been made ill. With such experience it had become a sanitary rule of hospital construction that the walls should be constructed with a non-absorbent and readily washable surface, and this sanitary rule ought to be universal as a principle of construction for common habitations. The common lath-and-plaster constructions—the laths which rotted, and paper which harboured vermin—were unwholesome. The common wall constructions were, moreover, objectionable from their tendency to absorb damp. Every common brick in lower-class dwellings absorbed a pound of water, and thus a two-storied cottage, when completely saturated with moisture, would absorb as much as six hundred gallons. To protect the inmates from driving wet, expensive slate coverings were often resorted to. But it was not alone the driving wet, but the wet rising from the ground, carried up by capillary attraction, in these walls of absorbent, spongy stone, as well as of brick, that had to be guarded against. The evaporation of the excessive wet lowered temperature, and the chills thus caused frequently induced the use of stimulants. Damp lowered the bodily condition, and rendered it more susceptible to disease. Numerous cases of rheumatism, so common in the country, were due to the damp of the walls of the cottages in which the people lived rather than to the wet of the fields in which they worked. But the evil was not confined to the lower class of houses. The damp material, of which better class houses were constructed, rendered them unsafe to inhabit for nine or twelve months after their construction, when they had undergone some degree of drying. A row of newly-constructed middle-class houses was sure to be the seat of an extra amount of sickness immediately after their first occupation, as medical men were well aware. For the prevention of this species of evil, he had some time ago imagined and endeavoured to promote wall constructions with hollow hard-burnt non-absorbent vitreous bricks. Houses might thus be built so that they might be safely occupied at once. Walls of the common material, though cheap to construct, were certainly dear to use. But if the hollow bricks were made of a large size, hollow pots in fact, they were cheaper to construct. The obstacles to their introduction had been that they required special and large machinery for their production, and an alteration of trade habits of construction. Plans and estimates had been prepared at his instance, by Mr. Robert Rawlinson, and these having been submitted to an eminent builder, his estimates showed an economy of 20 per cent. On the builder being asked whether this form of construction was practicable, he had said "Yes," but when asked, "Will you adopt them?" he had said, "No, I will not; because this large form of brick will require two hands to use them, and my men will strike when I attempt to introduce it. Thus there will be a great deal of trouble in altering the present practice and habits of construction; and when I have done it all, and proved the economy of the work, other builders will profit by my experience, and build as cheaply as myself. I shall have all the trouble of the change, and I shall have no profit from it, so I will not undertake it." Other large firms took the same view, and so improvement was stopped. Hollow bricks of the common form, and somewhat less absorbent, had been got into occasional use, but a complete reform of the present deleterious principles of construction had yet to be accomplished. The late Capt. Fowke had directed his attention to some forms of concrete, as an improvement upon the common brick construction, and had had some preliminary trials made with concrete made of Portland cement and of Scott's cement, which showed that the concrete was not from one-third to one-fifth so absorbent as common brick, and might receive an almost perfectly non-absorbent and washable interior facing, which was a great desideratum. The material, sand or gravel, or breakable stone, or the slag of furnaces, was procurable everywhere. There was a lodge of concrete, and walling of concrete, at the South Kensington Museum. He had seen some cottages on the Marquis of Salisbury's estate at Hatfield, where he had built a church and a farmery, and where a park had been walled with concrete. The occupiers of the cottages and the farmer attested the dryness of the walling, which was the essential sanitary point, and as to the economical question, the cost was about half that of brickwork. In cottage constructions, half the expense was the walling and other parts now made of brickwork. Now, if this half was reduced one-half in cost, if 5½ per cent., were gained by the common constructions, seven per cent. or more appeared to be attainable by this new form of construction, almost anywhere, even without new or costly machinery for "pot" manufacture, for which we should have to wait. He considered that trial works of new materials were now a great desideratum.

Mr. Hawes confessed, when he read the title of the paper, he expected to hear something new about the cost and construction of cottages, whereas the author had not spoken of any improved modes of construction other than those practised with the greatest success by Alderman Waterlow. The principal point on which stress was laid was, that the Government should guarantee a certain minimum rate of interest on any funds which the public might provide for these purposes; and that proposition had been brought forward by the author of the paper as an amendment upon the bill of Mr. McCullagh Torrens, the principle of which was, that Government should lend money upon the security of the buildings, when erected, at a low rate of interest. There was a great distinction between the two plans, and he thought Mr. Torrens's plan was the best; for by the system of a guarantee, all security for the proper management of the property was lost, whereas, in the case of a loan, this was not so. It was to improved construction and management that they must look for success. The mere obtaining of money was of little use, unless as a means of carrying out really well-digested and well-

considered plans. Dr. Hawkesley's paper repeated, in language of a very attractive character, but still repeated, he thought with very considerable exaggeration, a great many of those statements which were frequently indulged in in the discussion of this subject. They were told that the average rate of mortality in the poor districts was 33 per 1,000; but, in considering this question, was it fair to take the maximum rate of mortality and then compare it with that in the model lodging-houses, which were occupied by the best sort of people of the class referred to—by the most industrious and cleanly as well as those with the smallest families? For it was only the better classes of workmen who could take advantage of these model dwellings. It was, therefore, an exaggeration to infer, from the fact of the mortality in these lodging-houses being only 17 per thousand, that, if such dwellings became general, the whole mortality would be reduced from 33 to 17 per thousand. As to the obtaining of capital for the erection of such dwellings, there was no doubt that, unless they could be made a profitable investment, it was useless to attempt it on a large scale. The subject was too vast to be treated as a matter of philanthropy, or otherwise than as a purely commercial question. As soon as it could be shown that good profit would result, there would be plenty of money forthcoming; but here was the difficulty. With regard to the proposition of Mr. McCullagh Torrens, he (Mr. Hawes) was not entirely an advocate for that Bill. He thought that which was prepared by the Social Science Association was superior to it. But in both Bills the great object was directed not only to providing buildings of a superior class, but also to destroying the bad buildings which now existed, and which were at the present time the seats of disease and crime. There were thus two objects to be attained. They might say to the public—"Help us, not only for the sake of the profit you will derive from the investment of your capital, but because such investment well-directed will materially reduce the rates which you pay annually, and which are owing to the presence of all this vice and misery." On such grounds as these they might fairly ask Government to lend money on good security, and they might obtain the money at the lowest rate of interest, making the Government mortgagees of the property so created. On no other condition, he thought, had they any more right to go to Government for help than had any other commercial enterprise. But could they get from Government assistance enough? He contended, if the Government lent as much money as it could upon the security of the buildings, unless the remainder of the capital would pay more than five per cent., they would not get the other half from the public. Suppose they required a capital of two millions, they might borrow one million from the Government and obtain another from the public; on the moiety advanced by Government they would pay —say 3½ per cent.—but they must make sure they could pay more than five per cent. on the other half before they could get it. They were told that 200,000 people were required to be lodged, and that the present accommodation in model dwellings extended to only 8,000 or 10,000. The implied inference was, that they at present lodged 8,000 or 10,000 adults, but this number included adults and children too; they had not, probably, more than 2,000 families housed in these places; moreover, accommodation was required for many more than 200,000—something like a million—if the question were fully dealt with. His friend Mr. Chadwick had spoken about modes of construction, but he would not follow him into those details, for he thought the builders of the metropolis might safely be trusted to find out the best way of building houses cheaply. He believed if concrete was really better than bricks they would have used it before. There was a limit to which concrete could be successfully used—beyond this point they must, of necessity, introduce bricks; and no men knew better than the great London building contractors where the economy of the one material ended and of the other began. No doubt certain qualities of bricks would absorb a considerable quantity of water if they were saturated by being immersed in it, but it could not be imagined that a brick in the ordinary position on the surface of a wall would absorb a pound of water by exposure to rain. This was one of those exaggerated statements which really did more harm than good. All exaggeration retarded rather than promoted the progress of sound principles with regard to this question, so beset as it was by real and substantial difficulties.

Mr. W. E. Newton said that past experience on this subject proved the accuracy of the remarks of the Prince Consort when he said, if they did not succeed in making these dwellings pay a good interest it would be quite impossible to meet the immense demand that had arisen for them. The philanthropic societies of which they had heard had no doubt done a great deal of good; they had inaugurated a better class of dwellings, and shown how the thing might be done; but they were a long way behind what was required. He might surprise many people when he said he thought the philanthropic societies had done wrong in endeavouring to give the working classes too many luxuries, which they did not require, and did not ask for; the consequence was the dwellings cost a great deal more than they need have done, and it followed that too high a rent must be charged. It was well known that the tenants of the houses built by these societies were not of the class which most stood in need of aid. They were the *élite* of the working classes, and formed but a small fraction of the population. Mr. Newton then proceeded to give some details of houses for the working classes which he is now engaged in constructing in Paris for the Emperor. Those houses were to be fifty-four in number, and several were already finished. They consisted of double houses, each containing apartments for six families, each family having a living room, bed room, kitchen, and separate water closet; with separate water supply for culinary and sanitary purposes. In the original plans submitted by him (Mr. Newton) to the Emperor and Empress, his Majesty made some modifications, sketching them on paper himself; and the houses were being erected according to the plans thus amended by the Emperor. There were cellars in the basements, and the cost of each of these double houses, capable of accommodating six families each, was, without the cellars, £480, and with the cellars £550 per pair. Mr. Hawes had spoken slightingly of concrete, but he could tell that gentleman that the houses were built of concrete almost entirely; and he could point them to houses he had built at Norwood, in which the entire walls, floors, and roofs, were of concrete. He had even succeeded in laying a roof, of 16 feet span and 38 feet long, not more than three inches thick of concrete. He thought that considerable economy resulted from the use of this material, as he calculated the cost was less than half what it would be if brick or stone were used. With regard to the houses in Paris, he wished to state that he started with the idea of not employing skilled labour in their construction, as that would have added very much to their cost. Acting upon that idea, loiterers on the boulevards, who were willing to work, were employed to mix the concrete and fill it into the moulds at such wages as 2½ francs per day. The operations were carried on in four houses at a time, and the walls of each were raised 18 inches or two feet per day by filling concrete into a mould fitted for the purpose, into which the concrete was shovelled, and when a piece was dry, the mould was raised and the operation repeated.

The Chairman inquired what was the thickness of the concrete walls as compared with brick walls?

Mr. Newton replied, he should not object to trust a concrete wall one-third less in thickness than one of brick. He spoke of actual construction he had carried out. He had built a garden wall 100 feet long, 9 feet high, and 9 inches thick, entirely of concrete, and it stood perfectly well. He would not hesitate to carry

up concrete walls of houses 9 inches thick and 25 feet in height.

Mr. George Cruikshank said, having given some attention to this subject for the last half-century, he had arrived at the conclusion which he had expressed as one of a deputation to Lord Derby—that, in order to remedy the great evils which had been described, it was necessary to rebuild a large part of this metropolis. His plan for doing this—which would appear in a little pamphlet shortly to be published—was that streets of houses should be built with shops below in each house, so that the street itself should form a market, from which every commodity required by the inhabitants could readily be procured. He regarded fire-proof staircases as a matter of paramount importance in dwellings for a large number of families. His plan was to have double houses, with a fire-proof staircase in the centre common to both; and he would have the rooms of such a size as to admit of thorough ventilation. A plot of ground in the City-road had been offered to him, and the only thing he wanted was the capital with which to commence building. The present model lodging-houses were good as far as they went, but they did not answer the purposes of the general community of the working classes. The idea of some persons seemed to be to build houses in which both the better and the lower classes of artizans might live. That he believed was impracticable, from the simple fact that the more respectable people would not live in the same houses with those whose habits were such as to render residential association with them impossible. The only plan was to provide separate accommodation for the respectable and well-conducted people, and that would make more room for the others. He was strongly in favour of compulsory measures being employed for compelling the owners of houses inhabited by the poor to have them well cleansed and properly ventilated. He need hardly say that in the plan he hoped to be able to carry out he had no desire for any profit to himself, but only to benefit the community.

Mr. Newton added that the houses he had built in Paris were constructed fire-proof, so that if a fire occurred in one apartment it could not communicate to another.

Mr. G. B. Galloway said he believed that concrete was the best and cheapest material, but he would combine with it a kind of skeleton framework, which would be filled up with concrete, and thus form the house. On each floor he proposed to have four rooms, a living-room, two bed-rooms, and a kitchen, scullery, and all necessary appendages. Then he would have a bell to each floor, and have the name of the occupant on the handle, and he believed, with due regard to economy, each floor would not cost more than £120, and could be fairly let for £8 per annum. He considered it a national disgrace that no Englishman should have followed the example of George Peabody, though there were some equally wealthy who were content to express their sympathy only with the working classes, but did nothing of a practical character. He suggested that all real philanthropists should come forward and subscribe to a national fund, and then it would be very easy to secure the best plans for erecting suitable and healthy dwellings for the working classes.

Mr. Botly drew attention to one important point as affecting the healthy character of dwellings, that they should, as nearly as possible, face the south, and not the east or north.

Mr. R. N. Philips, M.P., said one of the great difficulties in the way of providing better accommodation for the working classes was how to remove the present buildings, which were not fit for human habitation. They all knew that the rights of private property must be maintained, but where private property derived a benefit from that which was detrimental to the interests of society at large, it ought to give way. Mr. McCullagh Torrens's Bill had been mentioned, and in a great measure he cordially approved of its provisions, but he would hardly go the length of raising money from the ratepayers to pay for the improvements. He was one of those who believed that if this property, which was dangerous to public health, were only destroyed, architects and builders would come forward at once and replace it with proper buildings. It was found in the manufacturing districts in the north that the only way to secure intelligent and respectable workpeople was to provide proper accommodation for them in the neighbourhood of their labour, and he believed that the same principle would be found to answer in London. If a considerable space of ground were cleared in the neighbourhood of any large works, there would be no lack of capital to build new dwellings for the working population, for the simple reason that they would be sure to be remunerative.

Mr. Robinson thought the effect of Mr. McCullagh Torrens's Bill would be rather to reward the owners of property in a bad condition for neglecting it than to inflict any loss upon them in consequence. By the provisions of the Bill, the owner could compel the Government to become the purchasers of his houses or property, and he did not see how they could provide for giving him less than the value of it as decided by the ordinary tribunals. Another proposal was that Government should purchase the equitable rights, but the great difficulty would be to ascertain what these were. He believed that the great objection to most of the philanthropic efforts in this direction was, that they put too strict a limit on themselves as to the amount of rent or profit which they would derive; and he was even of opinion that in this way they had retarded the progress which they sought to hasten, by leading commercial men and capitalists to believe that 5 per cent. was the maximum which could be obtained. For some time past he had been engaged in endeavouring to get gentlemen to invest money in buildings of this description, but he was met on all hands by the assertion that they did not pay. He said they did pay quite as well as they could be expected to do; and that being the case, similar undertakings, managed in a purely commercial spirit, would pay very well. Mr. Alderman Waterlow made his buildings pay, in some cases, 10, in others 9, 8, or 7 per cent., the average being an 8 per cent. rental, yielding 5 per cent. on the gross capital, a large portion of which was always unproductive. He believed the best thing which the philanthropic societies could do was to begin afresh, and endeavour to make the most they could out of their buildings, and thus remove the false impression which they had created. Then they might also get assistance from those who did not want 8 or 9 per cent.; he meant the class who were to be benefited. They were ready to combine in building societies, and in other ways to assist themselves and one another, and would render valuable help in this direction. There was a co-operative society in Edinburgh, established in 1861, the secretary of which had just informed him that they had already a paid-up capital of £10,000, and by a system of building houses, selling them, and re-employing the capital set at liberty, they had actually been able to build 212 houses and five shops in the outskirts of the town at a cost of £40,650. He thought the plan of selling the houses when completed, and re-employing the capital, was an advantageous one, and should not be lost sight of.

Professor Kerr said, as a writer on this subject, he should be sorry to allow the discussion to close without attempting to introduce what he considered the practical view of the case. He felt most decidedly that the Bill of Mr. Mc'Cullagh Torrens would, if passed, give a fresh start altogether to the action which had been taken with respect to the improvement of the dwellings of the working classes, but it seemed to him that the provisions of the bill were somewhat complicated. He would, as an architect and district surveyor, suggest that there was an analogous proceeding under the Building Act with regard to dangerous structures, which, if it were inquired into, would afford to Mr.

Torrens a much easier mode of attaining his object than the one he at present proposed. When a building in London was dangerous it was considered to be existing illegally, and the law could step in and pull it down, no matter who owned it, or what impediments were thrown in the way. Therefore, if a building were injurious to health and dangerous in *that* way, why could not the law be made to step in and pull it down in precisely the same manner? The mode in which a dangerous structure was pulled down was simply this:—The police, on being requested to examine a building, if it were dangerous, would pronounce it so. The matter then had simply to be carried before a magistrate (in this particular case no jury being required), and if the magistrate supported the police, down the place must come. Why could not similar machinery be put in force with regard to buildings dangerous to health? Then it was a very large question how to provide better dwellings for the working classes when the old ones were pulled down, and it was one which had not been touched that evening. Three nights had been spent in its discussion at the Institute of Architects a short time previously, in consequence of a paper which he had been permitted to read, but even those three nights of discussion did not produce very much. The subject was one which it was no use touching merely on the surface, but he might just say he did not think concrete settled the question of poor men's dwellings at all. As to building a wall in concrete two-thirds the thickness of a brick wall it was perfectly out of the question. By the building act a wall 30 feet long and 25 feet high might be built 9 inches thick, and did anyone mean to say he could build that only 6 inches thick of concrete?

Mr. Newton said he would do so.

Professor Kerr said he thought such a plan was totally impracticable.

The Chairman said he thought they had met much more to consider the political and financial mode of raising the means for erecting proper dwellings than the question of how the houses were to be constructed. He quite agreed with his friend Mr. Hawes that this matter must be considered on purely commercial principles, for it was much too large an undertaking to be carried out by mere philanthropy. He believed ten millions sterling would be required to put London into a decent and healthy condition, and it was, of course, impossible to raise such a sum as that by mere benevolence. It must be done on the commercial principle, and until they could show that there was a prospect of 8, 9, or even 10 per cent., capitalists would not even entertain the question. He must take the credit to himself of having always seen the matter in that light. The great difficulty did not lie in providing dwellings for the better class of artisans, who earned from 25s. to 30s. or 40s. a-week; they were now being provided for in a variety of ways. Houses were springing up in all directions in the suburbs, and the institution of cheap trains enabled them to travel backwards and forwards easily. No doubt there were certain classes of skilled artizans who required to live in the neighbourhood of their work, and some provision must be made for them, but that was not the great class to which they were looking, which was rather the vast mass of the population, the hand-to-mouth labourer, people who lived on a casual 13s. or 14s. a-week, perhaps not even averaging 12s. a-week all the year round. He must take a little exception to what Mr. Hawes had said about exaggeration in these matters, for he was certain no one who had dived into those haunts of misery would say there could be any exaggeration as to their shocking condition.

Mr. Hawes begged leave to explain that he only complained of exaggeration in the estimated effects of better lodgings on the rate of mortality; he did not think it was fair to put it as a reduction from 33 to 17 per cent.

The Chairman said there was no doubt that when they came to precise figures they might easily be led into error. It might be a slight exaggeration to say that the mortality would be reduced from 34 to 17 per cent., but there could be no doubt that it would be reduced very materially. It was not only the physical but the moral effects which they had to take into account, and there was no doubt that these had an immense influence on the rate of mortality. His friend Mr. Cruikshank would be rejoiced to hear that the more they improved the condition of the people—giving them plenty of fresh air and healthy rooms—the more they reduced the tendency to habits of intoxication. He did not think that, as had been stated by Mr. Newton, they gave the working classes too much; if they gave them extra accommodation they made them pay for it, apartments of three rooms being let for 7s. or 8s. a week. He believed that what was really wanted was a room at 1s. 6d. or 2s. 3d. a week, to meet the requirements of the hand-to-mouth labourer, who had no fixed wages. This was the difficulty he found in connection with Mr. McCullagh Torrens's Bill, that it made little provision except for the higher class of artisans. He provided that these wretched buildings should be pulled down, but what was to be put up in their stead? He did not contemplate the erection of a large number of houses, consisting of single rooms, in which whole families were to be maintained—and though it would be objectionable, no doubt, to give such a social arrangement legislative sanction, yet it was an evil which at present they must put up with, and it was by providing such limited accommodation, of the best possible kind under the circumstances, and at the lowest rate, that the most good could be done. In connection with this he wished to draw attention to the operation of the Sanitary Act, which was passed in very great haste at the close of the last session, in the time of the cholera epidemic. A society with which he was connected had recently received an order from the Board of Works of the St. Giles's District, giving them three months in which to carry into effect all the provisions of this Act. One of the clauses required the houses to be whitewashed at least four times a year, or oftener if necessary; that all basements should be paved; that 15 gallons of water daily should be supplied to each individual; and that 400 cubic feet of air should be allowed to each person living in them. Now, this was not as if there had been a bad state of things existing in those houses. On the contrary, for a considerable number of years they had been remarkable for health and decency. They had, therefore, as good a claim to be let alone as anyone. Their object had been to provide accommodation for the very poorest, and they had succeeded in bringing down the rent to 2s. a week for a single room; but, if all these regulations were to be enforced, they would have to raise the rent fully 30 per cent., and to turn out a considerable number of their tenants. He could not conceive anything more oppressive than these regulations, and their ultimate tendency would be to stop all improvements of this character. It was a serious inconvenience to a family which had but one room, to have it completely whitewashed even once a year, and if that were increased to four times, it would be an intolerable nuisance. He believed that the Board of Works were acting in accordance with the letter, but in contradiction to the spirit, of the statute, and he hoped that they would go so far that public feeling would be aroused, and an alteration made in the law. He concluded by proposing a cordial vote of thanks to Dr. Hawksley for his most interesting paper.

Dr. Hawksley, in reply, remarked that the discussion having continued to so late an hour, he did not wish to keep the meeting a moment longer than necessary, and especially as the chairman had already so completely answered many of the objections that had been advanced. He only wished to explain to Mr. Hawes that no new designs for erecting buildings for the poor had been advocated in his paper, because he considered that the real difficulties of the case did not

lie in that direction; he thought they were much more in the nature of the means whereby to carry out the excellent and improved designs that already existed; consequently all the force of his argument had been thrown into the question of the best mode of obtaining the large amount of money necessary for the purpose. With regard to the objection of comparing the diminished mortality in the improved dwellings, not with the ordinary rate of the metropolis, but with that of the neighbourhood in which those improved dwellings were situated, he thought he had carefully protected himself from all charge of exaggeration by considering that, if seventeen per thousand be the mortality of the population in the improved dwellings, and twenty-four that of the metropolis, it followed (the mortality of the upper and middle classes in London not being more considerable than that of the inhabitants of the model lodgings) that, supposing of the three millions of population in the metropolis, two of them, represented by the upper, middle, and well-lodged of the humbler classes, corresponded to the rate of 17 per thousand, there would of necessity be a death-rate as high as 38 per thousand for the remaining million to make up the average of 24. In making the comparison therefore of 17 to 33 as the probable difference between the inhabitants of the improved dwellings and those of the squalid abodes round them, he thought he was quite within the limits of fact. He was sorry that the time would not allow him to answer the other gentlemen who had kindly assisted in the discussion, and he begged to thank Mr. Newton for his interesting information regarding concrete which accorded with that he had received through other channels.

Mr. W. E. Newton writes as follows:—As some of the gentlemen who spoke after me appeared somewhat sceptical as to the strength of concrete and its applicability for the construction of buildings, and seemed to think that the advocacy of this material was an "amiable weakness," it may perhaps be interesting to state the nature and composition of the concrete which has been successfully used in constructing the Emperor's "Maisons Ouvrières" in the Avenue Dumesnil, Paris, and also that used by me in the works I have carried out here. In Paris we used one part of Portland cement (C. Francis and Sons) to five parts of large gravel stones, varying in size, from the size of pearl barley to that of peas. The fine sand is sifted or screened out, put on one side, and used for making stucco for facing the work. At this place I find it more economical to use burnt brick earth, or "brick ballast," as it is called, from which I sift out the very fine, and add one of Portland cement to 8 of ballast. This makes a very hard wall. I have even reduced the cement to one in ten with perfect success. I burn the ballast myself and it costs me under 2s. per cubic yard. Therefore, if we take one yard of ballast at 2s., and 2½ bushels of cement at 1s. 10d., we shall have a cubic yard of concrete for 6s. 7d., to which add 2s. 3d. per yard for labour, and we shall find we can put up a superficial yard of nine-inch work for less than 3s. One gentleman ventured to question the possibility of building a wall 30 feet high in 9-inch work. I only say that this has been done by Mr. Tall, and the houses so constructed have been sold by him at a very large profit. From the numerous experiments I and others have made in concrete constructions, I have no hesitation in offering the following challenge to the sceptics, viz., that they shall build a wall of any dimensions in common brick and mortar with or without Tyerman's bond, and I will build one in concrete; and if the concrete wall does not sustain a greater weight than the brick wall I will forfeit to them £50 and the cost of the wall, they undertaking the same liability to me should the brick wall not stand an equal test."

Mr. Samuel Sharp has forwarded the following statement relative to the cost of constructing dwellings of concrete for the labouring classes, viz.:—

(1.)	One room, 12 ft. by 12 ft. and 7ft. high ..	£30
(2.)	Two do., „ „ ..	60
(3.)	Suite of 3 rooms, scullery, and w. c. ..	100
(4.)	Do. 2 do., „ „ ..	75

The saving by building of concrete and Nicol's patent partitions and roofs is 25 per cent.

Ground rent for 3 rooms, £3 per annum.
Do. 1 room 4d. to 6d. per week.
Do. 2 rooms 7d. to 10d. do.

in the centre of London; in the suburbs at least one-half less.

The foregoing calculation is without including the purchase of the land. If this is added, the sums (1), (2), (3), and (4), will be raised to £50, £100, £160, and £115 respectively.

Proceedings of Institutions.

Union of Lancashire and Cheshire Institutes.—Special Prizes for 1867.—The Council of the Union offer the following extra prizes to candidates connected with Institutes in the Union:—1. Two prizes, of £1 10s. and £1, to the two candidates who shall obtain the highest aggregate number of marks at the Society of Arts' Examinations. 2. A copy of Black's Atlas will be given to the candidate who shall obtain the highest aggregate number of marks in Geography at the examinations of the Society of Arts and the Science and Art Department; donor, Mr. J. Heywood, Manchester. 3. A chemical laboratory, suitable for the private study of chemistry, will be given to the candidate who shall obtain the highest aggregate number of marks in Chemistry at the examinations of the Society of Arts and Science and Art Department; donor, Mr. Woolley, Manchester.

PARIS UNIVERSAL EXHIBITION.

The commissioners appointed by Her Majesty to advise on the best mode by which the products of industry and the fine arts of the United Kingdom, the British colonies, and dependencies, may be procured and sent to the Universal Exhibition of Works of Industry and Agriculture to be holden in Paris in the year 1867, and to appoint jurors, have appointed the following as presidents, vice-presidents, jurors, and associates, to represent the United Kingdom in the International Jury.

List of Jurors and Associate Jurors.

(The names in parentheses are associate jurors.)

Works of Art.—Paintings in oil, Viscount Hardinge (John Leslie, Esq.). Other paintings and drawings, Hon. Spencer Cowper (S. Vincent, Esq.). Sculpture and die-sinking, A. H. Layard, Esq., M.P. (W. Calder Marshall, Esq., R.A.). Architectural designs and models, J. Fergusson, Esq. (Lieut.-Colonel Scott, R.E.). Engraving and lithography, R. J. Lane, Esq., A.E.R.A.. and F. Seymour Haden, Esq., F.R.C.S. (Julian Marshall, Esq.)

Apparatus and Application of the Liberal Arts.—Lord Houghton, Vice-President. Baillie Cochrane, Esq., M.P., Associate Vice-President. Printing and books, George Clowes, Esq. (C. Rivers Wilson, Esq.). Paper, stationery, binding, painting, and drawing materials, Warren de la Rue, Esq., F.R.S. (F. Hankey, Esq.) Applications of drawing and modelling to the common arts, R. Redgrave, Esq., R.A. (H. A. Bowler, Esq.) Photographic proofs and apparatus, Dr. Hugh W. Diamond (Lieutenant-Colonel Gordon, C.B. R.E.). Musical instruments, Lord Gerald Fitzgerald. (Hon. Seymour Egerton, 1st Life Guards.). Medical and surgical instruments and apparatus, Sir J. F. Olliffe, M.D. Mathematical instruments and apparatus for teaching science, C. Brooke, Esq., M.A., F.R.S. (Lieutenant-Colonel Strange, F.R.S., F.R.A.S.). Maps and geographical and cosmographical apparatus, Captain G. H.

Richards, R.N. (Lieutenant-Colonel A. C. Cooke, R.E., F.R.G.S.).

Furniture and other Objects for the Use of Dwellings.—Fancy furniture, J. H. Pollen, Esq., M.A. Upholstery and decorative work, Matthew Digby Wyatt, Esq., F.S.A. Crystal fancy glass and stained glass, E. W. Cooke, Esq., R.A., F.R.S. (Henry Chance, Esq.). Porcelain, earthenware, and other fancy pottery, Right Hon. W. E. Gladstone, D.C.L., M.P. (J. C. Robinson, Esq., F.S.A.). Carpets, tapestry, and other stuffs for furniture, Peter Graham, Esq. Paper hangings, J. G. Crace, Esq. Cutlery, G. Wolstenholm, Esq. (C. Asprey, Esq.). Gold and silver plate, Percy W. Doyle, Esq., C.B. (G. J. Cayley, Esq.). Bronzes and other art castings and repoussé work, no juror allowed. Clocks and watches, C. Frodsham, Esq. Apparatus and processes for heating and lighting, Professor J. Tyndall, LL.D., F.R.S. (Rear-Admiral Ryder, R.N., C.B.). Perfumery, Dr. W. Odling, F.R.S. Leather work, fancy articles, and basket work, J. M. Stanley, Esq. (F. West, Esq.).

Clothing (including Fabrics) and other Objects worn on the Person.—Duke of Manchester, President; the Right Hon. Sir W. Hutt, M.P., K.C.B., Associate President. —Cotton thread and fabrics, Malcolm Ross, Esq. Thread and fabrics of flax, William Spotten, Esq. Combed wool and worsted fabrics, W. Morris, Esq. (J. Law, Esq.). Carded wool and woollen fabrics, Edward Huth, Esq. (H. S. Way, Esq.). Silk and silk manufactures, Sir B. S. Phillips (C. S. Haden, Esq.). Shawls, W. H. Clabburn, Esq. Lace, net, embroidery, and small ware manufactures, Daniel Biddle, Esq. (Thomas Ball, Esq.). Hosiery and under-clothing, and articles appertaining thereto, A. J. Mundella, Esq. Clothing for both sexes, Lieut.-Colonel Hudson. Jewellery and precious stones, Earl Dudley (N. H. M. S. Maskelyne, Esq.). Portable weapons, arms, and military equipment, Major-General Sir W. Gordon, R.E., K.C.B. (Major-General C. Dickson, R.A., C.B.). Travelling articles and camp equipage, Sir S. Baker and Edward Page, Esq. (M'Leod of M'Leod). Toys, no juror allowed.

Products (Raw and Manufactured) of Mining Industry, Forestry, &c.—Mining and Metallurgy, S. H. Blackwell, Esq. (Captain W. S. Roden). Products of the cultivation of forests, and of the trades appertaining thereto, Hon. F. D. M'Gee (P. L. Simmonds, Esq.). Products of shooting, fishing, and of the gathering of fruits obtained without cultivation, Professor Wyville Thomson, F.R.S. Agricultural products (not used as food) easily preserved, D. Hanbury, Esq. (Dr. T. Thomson, F.R.S.). Chemical and pharmaceutical products, Dr. Frankland, F.R.S. (Dr. David Price). Specimens of the chemical processes for bleaching, dyeing, printing, and dressing, Sir Robert Kane, F.R.S. (Dr. David Price). Leather and skins, Dr. Forbes Watson, A.M., F.R.S. (J. Evershed, Esq.).

Apparatus and Processes Used in the Common Arts.—Lord Richard Grosvenor, M.P., Vice-President; H. C. E. Childers, Esq., M.P., Associate Vice-President. Apparatus and processes of the art of mining and metallurgy, W. Warrington Smyth, Esq., M.A., F.R.S., Pres., G.S. (Dr. C. Le Neve Foster, F.G.S.). Agricultural apparatus and processes used in the cultivation of fields and forests, Jacob Wilson, Esq. Apparatus used in shooting, fishing-tackle, and implements used in gathering fruits obtained without culture, Col. Hon. F. H. Keane (Major Edwards, R.E.). Apparatus and processes used in agricultural works and in works for the preparation of food, James C. Amos, Esq. (C. Wren Hoskyns, Esq.). Apparatus used in chemistry, pharmacy, and in tan-yards, Dr. Lyon Playfair, C.B., F.R.S. (Professor T. C. Archer). Prime-movers, boilers, and engines especially adapted to the requirements of the exhibition, J. Scott Russell, Esq., M.A., F.R.S. (Captain Beaumont, R.E.). Machines and apparatus in general, the Earl of Caithness and Robt. Mallet, Esqrs., Mem.I.C.E., F.R.S. (John Anderson, Esq.). Machine tools, G. W. Hemans, Esq., Mem.I.C.E., F.R.G.S., F.G.S. Apparatus and processes used in spinning and rope-making, R. D. Marshall, Esq. Apparatus and processes used in weaving, M. Curtis, Esq. Apparatus and processes for sewing and for making up clothing, Peter Tait, Esq. (Captain Ponsonby Cox, R.E.). Apparatus and processes used in the manufacture of furniture and objects for dwellings, Lieut.-Colonel Ewart, R.E. Apparatus and processes used in paper-making, dyeing and printing, Wyndham S. Portal, Esq. Machines, instruments, and processes used in various works, C. F. Bayer, Esq. Carriages and wheelwrights' work, G. N. Hooper, Esq. Harness and saddlery, Captain Fenn (Henry Göschen, Esq.). Railway apparatus, J. E. M'Connell, Esq., Mem.I.C.E. (Sir D. Campbell, Bart.). Telegraph apparatus and processes, C. Wheatstone, Esq., F.R.S. (Lord Sackville Cecil). Civil engineering, public works, and architecture, C. H. Gregory, Esq., Mem.I.C.E. (Major A. Clarke, R.E.). Navigation and life-boats, Captain E. Arrow. (Rev. J. Woolley, LL.D.).

Food (Fresh or Preserved) in Various States of Preparation.—Cereals and other eatable farinaceous products and the products derived from them, J. Druce, Esq. (C. Woolloton, Esq.). Bread and pastry, no juror allowed. Fatty substances used as food, milk and eggs, no juror allowed. Meat and fish, no juror allowed. Vegetables and fruit, no juror allowed. Condiments and stimulants, sugar and confectionary, G. Moffatt, Esq., M.P. Fermented drinks, Hon. H. G. Howard (E. L. Beckwith, Esq.).

Live Stock and Specimens of Agricultural Buildings.—Farm buildings and agricultural works, no juror allowed. Asses, horses, mules, M. Higgins, Esq. (Captain Cockerell). Bulls, Buffaloes, &c. Sheep, goats. Pigs, rabbits. Poultry. Sporting dogs and watch dogs. Useful insects. Fish, crustacea, and mullusca. No jurors allowed.

Live Produce and Specimens of Horticultural Works.—Duke of Cleveland, K.G., president. Hothouses and horticultural apparatus, Professor Balfour, M.D. (Dr. T. Thomson, F.R.S., also in raw and manufactured products). Flowers and ornamental plants. Vegetables. Fruit trees, no jurors allowed. Seeds and saplings of forest trees, Dr. J. D. Hooker, F.R.S. (Dr. Moore). Hot-house plants, James Veitch, Esq. (F. W. Brady, Esq., Q.C.).

Articles Exhibited with the Special Object of Improving the Physical and Moral Condition of the People.—Sir J. P. Kay-Shuttleworth, Bart., vice-president. Apparatus and methods used in the instruction of children, Rev. Canon Norris, M.A. (E. C. Johnson, Esq.). Libraries and apparatus used in the instruction of adults at home, in the workshop, or in schools and colleges, Rev. W. Rogers, M.A. (Rev. M. Mitchell, M.A.). Furniture, clothing, and food from all sources, remarkable for useful qualities combined with cheapness, Viscount Canterbury (Nassau J. Senior, Esq.). Specimens of the clothing worn by the people of different countries, no juror allowed. Examples of dwellings characterised by cheapness combined with the conditions necessary for health and comfort, no juror allowed. Articles of all kinds manufactured by skilled workmen, no juror allowed. Instruments and modes of work peculiar to skilled workmen, no juror allowed.

(Signed) Albert Edward, P.

OPENING OF THE PARIS EXHIBITION.

The exhibition was duly opened on Monday, April 1st, according to the original arrangement. His Majesty the Emperor, accompanied by the Empress, arrived at the chief entrance to the park and passed up the main avenue to the chief door of the building.

Within a few days the appearance of this part of the park has undergone an extraordinary change; tall Venetian masts, painted green and relieved by gilding, have been set up on each side along the entire length of the avenue, about five hundred feet, and between these, at

mid-height, are stretched a series of strong squares of canvas, covered on the under side with a handsome green material, powdered with golden bees. These squares are united to each other by means of a series of hooks, and form a truly imperial canopy along the entire route, the effect being greatly heightened by a bordering of the same material as the velum, dentated and enriched with a bold pattern in gold embroidery. At the top of the masts, and also on the flag staves on the building itself, float brilliant pennons, which give a festive air to the whole scene and relieve the effect of the massive iron structure in a very agreeable manner.

Entering the building by the chief door, the imperial party halted for a few moments in the open space in the great machinery court, between the limits of the French and English sections. The two sides of this space present a curious contrast; on the French are trophies of iron and brass work and materials, towering up to within a few feet of the spring of the roof, while on the English side stands the Victoria gold pyramid, which since 1862 has grown to the height of sixty or seventy feet; around its base are ranged the steam cranes which have performed signal service in the arrangement of the British section, and on the opposite side of the gallery stand an Eng ish pillar post-box, a series of sorting tables, and other post-office materials, and a beautiful model railway with a travelling post-office, consisting of three vans, that in the centre acting as a tender to the other two, and being fitted with the ingenious apparatus for taking in and delivering the mails *en route*. These models are made to the scale of 1 in 4, are beautifully made, and exhibit the whole arrangement in an admirable manner. On one of the descriptive blinds of the great windows above, the invention, if the expression may be used in such a case, of penny postage is recorded in full characters beneath Sir Rowland Hill's name.

Starting from this point, the imperial party and suite made the complete tour of the machinery court by the spectators' gallery in the centre.

The sides of this gallery are carried out at intervals so as to form niches, and in these latter the foreign commissioners and jurors, each party in their own "sector" of the building, were placed and presented to their Majesties in succession.

The whole of the machinery and other articles exhibited in this great court are not yet in perfect order, but there are very few vacant spaces, and the mass collected within the iron walls is prodigious.

Having made the complete circuit of the building, their Majesties passed through the grand vestibule to the French Fine Art Court. The vestibule does not possess the magnificent proportions of the grand naves of either of the previous Universal Exhibitions, and its roof is heavy, both in form and colour. Nearly the whole of the clerestory windows, both on the French and English sides, are filled with stained glass, much of it brilliant in colour, and generally, though not universally, harmonious; while the bays below exhibited a splendid collection of wares of various kinds. On the English side these bays, which form the termini of the various groups, have been completely arranged for some days, and called forth great admiration. The beautiful casts of the sculptured works from Campo Santo and St. Jago have already been mentioned. Near these stands a magnificent chimney-piece, in alabaster, with inlaid panels and cameos, by Wedgwood; a splendid collection of china vases, majolica, and other wares, by Minton and Copeland; a number of Elkington's beautiful reproductions; some good furniture, and other articles. On the French side, the arrangements were not sufficiently advanced to allow of anything like a complete show.

From the vestibule their Majesties entered the French portion of the Fine Art Gallery, and again made the tour of the building, though by a much more contracted zone; two *détours* were also made across the central zones, occupied by the industrial groups, by the two principal side avenues of the building, the Rue de France and the Rue de Russie.

In the various sections of the Fine Art galleries were stationed the ministers and officers of state, the diplomatic body, those ladies and gentlemen who had been honoured with special invitations, together with the foreign commissioners, jurors, and others who had quitted the gallery in the Machinery Court after the passage of the Imperial party.

The last section visited was the English Fine Art Court, and quitting this their Majesties passed across the enclosed garden along the avenue at the opposite side of the building, the Rue de Belgique and the park, by the gate opposite to that by which they had entered.

A good deal still remains to be done in the way of final arrangement, but the Exhibition presented on the whole a very creditable appearance, considering the vastness of its plan and the space which it occupies. The Russian, Swedish, Danish, and English departments may be said to be complete; in nearly all other sections of the building the imperfections were more numerous.

The picture galleries have all their walls nearly covered; the English gallery was not only arranged but matted and comfortable, and the whole collection of pictures is, beyond question, one of the finest that has been seen since 1855.

The weather was magnificent for April, indeed, it would have been fine for May; the sun was never once crossed by a cloud. The number of persons present was large—it is impossible to say how large—and the opening of the Exhibition, although not a ceremonial, must be considered a success.

Publications Issued.

Paris Universal Exhibition, 1867: the Complete Official Catalogue, English Version. Published under the authority of the Imperial Commission, by J. M. Johnson and Sons, Castle-street, Holborn, London; F. Dentu, Paris, Editeur de la Commission Impériale. This version was translated from the proof sheets of the French Catalogue, published by the Imperial Commission, and it is believed that this is the first instance in the history of International Exhibitions in which a complete catalogue has been prepared in a language foreign to the people where the exhibition was held. The translation was made by Mr. G. W. Yapp, who, as stated in the preface, only received the principal part of his copy within the last month, so that the volume has been produced with extraordinary rapidity, as it was in the hands of the public on the 29th ult. The price is 5s.

Paris Universal Exhibition, 1867.—Catalogue of the British Section. Printed for Her Britannic Majesty's Commissioners, and sold by Spottiswoode and Co. —This work contains a list of the exhibitors of the United Kingdom and its colonies, and the objects which they exhibit, and is in four different languages, English, French, German, and Italian. The introduction includes a brief account of the three previous International Exhibitions, and a statistical summary of the industries and commerce of the United Kingdom, prepared in accordance with the wishes of the French Commission. There is an illustrated appendix, containing detailed notices of many of the objects exhibited, the whole forming a thick volume, price 3s. 6d.

Correspondence.

Mr. Young's Paper on Flax.—Sir,—In your report of the discussion on Mr. Young's paper on "Flax," read

on Wednesday, the 27th ult., there is an inaccuracy in the first part of my remarks, which I shall be much obliged by your correcting. Instead of "800 acres of land, and producing about 3,000 tons of flax per annum," please read, "800 acres of land, *or* about 3,000 tons of *flax straw* per annum." Also my name is as undersigned. I am, &c.,
John C. Wilson.
East India House, 5, Lime-street, March 30, 1867.

MEETINGS FOR THE ENSUING WEEK.

Mon.....Society of Arts, 8. Cantor Lecture. Mr. John Hullah, "On Music and Musical Instruments."
London Inst., 7. Prof. Westwood, "On Entomology."
R. United Service Inst., 8½. Capt. Majendie, "On Military Breech-loading Small Arms."
R. Geographical, 8½. 1. Lieut. J. B. Bewsher, "Site of Kanaxa and Ancient Canals in Mesopotamia." 2. Mr. J. E. Taylor, "Sources of the Lycus and other Rivers in Kurdistan." 3. Mr. R. J. Garden, "Description of Diarbekr."
British Architects, 8.
Tues ...Medical and Chirurgical, 8½.
Civil Engineers, 8. Discussion upon Mr. Brooks' "Memoir on the River Tyne;" and (time permitting) Col. Sir Wm. Denison, "The Suez Canal."
Photographic, 8.
Ethnological, 8. 1. Dr. Hyde Clarke, "On Ancient European Mines." 2. Mr. J. Crawfurd, "On the Classification of the Races of Man according to the Form of the Skull." 3. Dr. Collingwood, "Visit to the Kibalan Village of Sano Bay, on the N.E. coast of Formosa."
Royal Inst. 3. Rev. G. Henslow, "On Botany."
Wed ...Society of Arts, 8. Mr. Robert Galloway, "On the Operation of the Chain Cables and Anchors Act, 1864."
Graphic, 8.
R. Society of Literature, 4½.
Archæological Assoc., 8½.
Thur ...Royal Inst., 3. Mr. Pengelly, "On the Antiquity of Man.'
Zoological, 8½.
Syro-Egyptian, 7½. Dr. T. B. Lowne, "On the Botany of Palestine."
Royal Society Club, 6.
Royal, 8½.
Antiquaries, 8½.
London Inst., 7. Prof. Bentley, "On Botany."
Naval Architects. Morning meeting, 12. Evening at 7.
Fri .....Astronomical, 8.
Royal Inst., 8.
R. United Service Inst., 3. Captain G. V. Fosbery, "On the Umbeyla Campaign of 1863."
Naval Architects. Morning meeting, 12. Evening at 7.
Sat .....Royal Inst., 3. Mr. Pengelly, "On the Antiquity of Man."
Naval Architects, 12.

Patents.

From Commissioners of Patents' Journal, March 29th.

Grants of Provisional Protection.

Ball or supply valves—690—J. Pearson.
Boots, &c.—418—T. Greenwood and J. Keats.
Boots, &c., cleaning—655—H. Churchman and F. Braby.
Bottles, &c., stopping—689—P. Duchamp.
Breech-loading fire-arms and cartridges—717—M. A. F. Mennons.
Bridles and reins—675—J. G. Tongue.
Buffing springs—704—H. L. Corlett.
Candles, ornamenting—671—A. Field and W. B. Nation.
Charcoal, animal—707—J. F. Brinjes.
Clay, utilizing—551—A. McDougall.
Electric telegraph conductors—694—D. Nicoll.
Engines—633—A. L. Normandy.
Fabrics, drying—698—W. Clark.
Fabrics, mangling—653—C. Mather.
Fibres, &c., twisting, &c.—541—W. Dyson.
Fibrous materials, cleansing—713—J. L. Norton.
Fibrous materials, preparing—555—S. Shore.
Fibrous materials, spinning, &c.—627—H. Barton and E. Whalley.
Fibrous materials, spinning, &c.—693—W. Dempsey.
Fibrous substances, grinding—714—W. Wood.
Filtering presses—587—E. T. Hughes.
Fire-arms, breech-loading—502—W. P. Gray.
Fire-arms, breech-loading—537—J. R. Cooper.
Fire-arms, breech-loading—677—M. A. F. Mennons.
Fire-engines—635—E. K. Heaps and T. P. Moorwood.
Fluids, measuring—631—C. W. Siemens.
Gas, &c., combusting—692—E. T. Hughes.
Hooks, hat and coat—710—J. A. Fussell.
Hops, drying—520—W. H. Samson.
Horses' feet, coverings for—533—G. Haseltine.
Horse-shoes—695—W. Akers.
Iron &c., coating—657—J. Turner.
Knobs—691—J. B. Fenby.
Ladies' garments, springs for—545—L. H. Philbois and A. Marcha .
Lamps—667—G. Dümler.
Land, tilling—497—J. Phillips-Smith.
Light, &c., obtaining—458—J. H. Johnson.
Lockets—665—T. S. Turnbull.
Metallic bedsteads—639—R. Luke and W. Parkes.
Minerals, mining, &c.—535—A. Howat.
Mines, ventilating—552—C. J. Pownall.
Mixing apparatus—637—A. Giles.
Motive-power engines—700—R. Wilson.
Mud, &c., mowing—702—T. Burt.
Paper—647—E. Lloyd.
Piston-rods, &c., packing for—543—J. McLintock.
Propulsion—696—M. P. W. Boulton.
Pterotypes—3163—J. Pratt.
Railways—549—A. V. Newton.
Railway signals, &c.—547—J. Livesey, J. Edwards, and W. Jeffreys.
Safety valves—643—A. V. Newton.
Sash fastenings—683—M. Cavanagh.
Sewing machines—687—A. Kimball.
Sizing and dressing machines—673—W. S. Lowe.
Slop pail and night commode, a combined—706—A. Parkinson and D. Sweaney.
Steam boilers—661—C. Mace.
Steam boilers—679—R. D. Napier.
Steam, generating—514—J. C. R. Weguelin and B. Hirst.
Steam, generating—645—J. G. Woodward.
Taps and valves—709—C. Maschwitz, jun.
Textile fabrics, printing on—346—R. E. Green and W. Laycock.
Valves—703—B. P. Walker.
Vulcanite, baking—688—F. Ryding.
Washing machines—697—M. Chamberlaine.
Weaving, looms for—716—W. J. Sleath and J. Hargreaves, jun.
Weaving, looms for—719—J. Boyd.
Wheel moulding machines—715—J. Willcock and S. Mason, jun.
Yarns, winding, &c.—712—W. Hall.

Invention with Complete Specification Filed.

Flour—838—G. T. Bousfield.

Patents Sealed.

2525. P. R. Hodge.	2613. G. Pitt.
2526. A. M. Dix.	2615. E. Peyton.
2531. F. Tolhausen.	2630. A. V. Newton.
2532. J. Cavannah.	3022. T. W. Webley.
2545. R. Mortimer.	3410. F. Watkins.
2558. D. H. Saul and H. P. Armstrong.	3412. F. Watkins.
	96. G. Haseltine.
2563. F. W. Kaselowsky.	124. H. Starr.
2564. F. W. Kaselowsky.	128. B. Lietar.
2579. W. Clark.	138. A. V. Newton.
2589. W. Clark.	

From Commissioners of Patents' Journal, April 2nd.

Patents Sealed.

2324. P. J. Railton & D. Walton.	2573. W. E. Hickling.
2530. T. Berney.	2574. S. Deacon.
2536. C. E. Brooman.	2581. A. Ripley.
2537. M. West.	2677. J. G. Tongue.
2551. J. W. Daniell.	2687. G. Haseltine.
2556. J. A. Coffey.	2722. T. Booth.
2571. G. Gordon.	3161. W. E. Newton.

Patents on which the Stamp Duty of £50 has been Paid.

770. M. Henry.	787. D. Treadwell.
766. E. Pace.	791. T. J. Smith.
845. J. N. Douglass.	815. W. E. Newton.
769. J. Lightfoot.	880. C. A. Ferguson, jun., and T. Ferguson.
772. J. Rees.	
782. A. Heald.	776. E. Grether.
833. W. E. Newton.	

Patent on which the Stamp Duty of £100 has been Paid.

805. S. R. Smith.	820. J. Reidy.
808. A. Pentzlin.	

Registered Designs.

4846—March 13—A grooved back strap for the Albini gun—H. Homer, Birmingham.
4847—March 13—A pair of shutter shoe fasteners—J. Harrison, 15, Union-street, Borough.
4848—March 18—Fitting for boxes or cases for packing guns and bayonets—Dean and Taylor, Birmingham.
4849—March 19—Friar Bacon's Miracle—M. Davis, 163, Strand.
4850—March 27—Apparatus for supplying boilers with substances to prevent incrustation—W. Oxley, Manchester.
4851—March 28—An indented eye needle—J. Beard, Birmingham.

Journal of the Society of Arts.

FRIDAY, APRIL 12, 1867.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'Clock:—

April 17.—*Passion Week.* No Meeting.

Cantor Lectures.

Mr. Hullah's course, "On Music and Musical Instruments," will be extended by two additional lectures, as follows:—

Lecture VII.—Monday, April 29.

Musical Instruments (*continued*).—The Bow—The Key-board—The Violin—The Organ—The Clavichord.

Lecture VIII.—Monday, May 6.

Modern Instruments, Chamber and Orchestral.—The Pianoforte—Combination of Instruments—The Orchestra.

The lectures commence at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend.

Subscriptions.

The Lady-day subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Food Committee.

The Sub-Committee on Milk met on Wednesday, March 20th. Present—Mr. Benjamin Shaw, in the Chair; Mr. James Caird, Mr. Harry Chester, Mr. McClagan, M.P., Mr. C. S. Read, M.P., Mr. Ludford White, and Mr. E. Wilson.

Mr. Alexander Wood (having attended on the invitation of the sub-committee) stated that he was Deputy-Chairman of the Great Western Railway, and was acquainted with the general arrangements for the transit of milk on that line. Milk had been carried on that line for some years, but the extension of that traffic was best shown by the return he had before him, which gave the quantity of milk carried monthly from January, 1865, to February, 1867, and during that interval the increase in the quantity carried was very large. In the month of January, 1865, there were carried 1,051 cans, containing 8,954 gallons, and realising a revenue of £55 1s. 10d. In January, 1866, the quantity carried during that month was 12,611 cans; so that in one year it jumped up from 1,051 cans to 12,611, containing 143,600 gallons, which was a very large increase in so short a time, and the revenue had increased from £55 odd to £719. That was about the period when the rinderpest was at its height, and no doubt that marked increase in the quantity of milk sent to London from the country dairy districts was due to the disappearance of the cows from the London cow-sheds. Going on to January in the present year he found the quantity was rather stationary. In that month the number of cans carried was 12,539, containing 143,588 gallons, producing a revenue of £718 16s. 5d. That was very nearly, indeed, the quantity that was carried in the corresponding month of 1866. During the last twelvemonths the trade had been almost stationary, not having much increased. In the intermediate months there was sometimes an increase, but it went down again afterwards. At the present time the quantity carried was slightly on the decrease. The largest quantity carried in any one month was in May last, when there were 16,706 cans, containing 285,918 gallons. In June there was not much difference; in that month there were 16,000 cans and 221,851 gallons. The larger quantity of this milk came from Purton, about six miles below Swindon, and 100 miles from London. At Swindon you get into the dairy districts of Wiltshire. The supply begins in the long valley of Berkshire, below Reading, and there you get into the grass country continuing to below Swindon.

Mr. Chester—Do the directors of the Great-Western Railway take any special steps to encourage this traffic, or is the supply left to develop itself?

Mr. Wood—This traffic has sprung up very suddenly, and the traffic-managers have been compelled to do the best they could to meet the sudden wants of the trade, and of course they take pains to do so. A number of old second-class carriages were as quickly as possible converted into milk-vans; but with regard to the cans in which the milk was carried the trade provided them.

Mr. Chester—Are there any regulations as to the size and shape of the milk-cans?

Mr. Wood—No; it was difficult to insist upon the traders, who found their own vessels, conforming to a particular description of can. When this milk-trade commenced, knowing that there is a very large milk-trade on the French railways, the general manager put himself in communication with officials in Paris, and obtained a specimen of the cans used in France. He was sorry they had not been able to induce the trade here to use a uniform description of can.

Mr. Caird—Do you consider that the French cans are better adapted for the purpose than those used in this country?

Mr. Wood thought they were. The French cans were only about half the size of those used here. Our cans were much too large and too heavy to be loaded and handled by one man. Whether the larger bulk of milk carried in each can had a prejudical effect upon the milk he was unable to say; but with regard to the handling of the cans at the stations, he thought the smaller-sized cans used in France were more convenient. The shape of the French cans was more convenient for packing in the vans. Our cans are broad at the bottom and tapering towards the top. The French cans, from their shape, could be packed with greater economy of space. The French milk trucks are very much like the narrow-gauge sheep-truck used in this country, with two floors, one above the other—two tiers, in which a great number of cans could be packed, and there was a circulation of air all round them. He thought one of the defects in carrying milk was carrying the cans in enclosed vans, because there was sometimes an escape of milk, which became sour, and he thought a circulation of air through the van was beneficial.

Mr. Chester—Are you aware whether the milk cans in France haveany covering over them in hot weather?

Mr. WOOD—Yes; they have a linen covering, which is watered and kept wet. We had recommended our officers to invite traders to do the same thing in summer-time; but only a few put a hayband round the top of the cans. In France the linen cover completely envelopes the cans, and when they were brought from a long distance they are watered during the journey, and the evaporation keeps the milk cool. The great merit he saw in the French cans was this. In carrying milk long distances by railway there was difficulty in preventing its churning, and the milk, when that process had commenced, was less valuable, from being carried a long distance, than milk which was brought from a much less distance in which no churning had taken place; and in which there was no separation of the fatty matters by the motion of travelling. The French get over that difficulty by completely filling the cans, and by having the top so arranged that it dips into the milk, and is kept in place by a screw stopper. By this means the milk becomes fixed tightly in the vessel, and thus no churning can take place.

Mr. READ—Have you any specimens of the French milk cans here?

Mr. WOOD believed there was one at Paddington, which he would be happy to send for the inspection of the committee. He did not consider the milk cans used in this country were adapted for carrying milk long distances. The cans were closed by a perforated top, and sometimes with a cloth round it, and if these cloths were not carefully washed there was an impurity which tainted the milk. The treatment of milk required the greatest cleanliness throughout. These cloths were sent backwards and forwards, and were not always as clean as they ought to be. The perforated top was so made because the milk was too frequently put in hot. It should be quite cold before it is despatched.

The CHAIRMAN remarked that he understood one difficulty with regard to the supply of milk to London from the provinces was with regard to cream. Till the milk could be brought in a state to yield cream, the case for the abolition of the London cow sheds was not met.

Mr. WOOD said, having occasion to go to Paris on railway business he made a point of seeing how the milk traffic was carried on on the Western of France railway.

The CHAIRMAN—Does not the deterioration or not of the milk depend a good deal upon the springs of the truck in which it is carried?

Mr. WOOD replied: If the milk were properly secured in the cans in the way he had pointed out, there was, he thought, a remedy at once against churning.

Mr. CAIRD—The milk-trade in Paris is very considerable. Have the railway companies provided any special carriages for the conveyance of the milk, so as to furnish a supply of air to the cans in the transit; and has there been, as far as you are aware, anything of the same kind done on the English railways?

Mr. WOOD apprehended the traffic in milk was not at present, on any railway in this country, of sufficient extent to lead any company to provide special trains for its conveyance, further than he had pointed out in the conversion of carriages for the purpose, as had been done on the Great Western.

Mr. CAIRD—Is it a new trade?

Mr. WOOD—Comparatively a new trade.

Mr. CAIRD—Looking to the propabilities of the increase of this traffic, do you think the railway companies would be likely to provide special vehicles for the carriage of milk?

Mr. WOOD said that, as he had before stated, there had been lately no marked increase in the quantity of milk carried on the Great-Western Railway; at the same time he considered it would be to the interest of the railway companies to promote this traffic as much as possible, and to give every facility for it.

Mr. WHITE—Do you think the traffic in milk on the Great Western is sufficient to warrant the company in providing daily special trains for it?

Mr. WOOD said it was to the interest, both of the company and the producers of milk, to make the arrangements for its carriage as perfect as possible. He had put the question to the traffic superintendent, as to whether the milk traffic was large enough for special quick trains, and he expressed an opinion that it was not, at present. In France there were, he believed, special milk trains, but there was this difference in France, as far as he could ascertain—they were satisfied with one train per day, in and out, consequently one milking per day only was sent out. It was so on the Western of France. Two trains per day would be required for the milk trade of London.

Mr. CAIRD—Was Mr. Wood aware whether there were any special arrangements made by the railway companies for the distribution of the milk when it reached Paris?

Mr. WOOD—There, again, there was a difference. As far as he was able to observe, in Paris a uniform description of van was employed in taking the milk from the station and bringing back the empty cans. He was not aware whether that was an organisation on the part of the railway company or on that of any individual or company formed for the purpose.

Mr. CAIRD, looking to the fact that milk was retailed in London to the consumers at a price more than 100 per cent. beyond what the dealers paid to the producers, suggested that the price to the consumers might be reduced, by an organised system for the distribution of the milk on its arrival in London, as compared with the present system. He would be glad to hear from Mr. Wood whether he thought there were any means by which the railways could bring the milk more within the reach of the consumers, and, at the same time, give a larger proportion of profit to the producer.

Mr. WOOD—He did not prosecute his inquiries beyond the transit on the railway. But, as he had said, he observed, on the arrival of a milk train, carts of the same construction were employed in carrying the milk from the station, and the same description of vehicles brought back the empty cans. He could not say whether these carts belonged to the administration of the railway, or whether they were provided by intermediate parties, who devoted themselves to the tra t of this description of cans to and from the railway ation. He had no doubt, by arrangement at the clearing house, the railway managers might be able to agree upon the right form of can, and he had no doubt the railway companies generally would adopt them. The milk was not delivered by the company in the case of the Great Western Railway when it reached Paddington; the rate of carriage was so low it would not pay the company to deliver. At present the milk was brought by slow passenger trains—not parliamentary trains, but mixed trains, which stopped at most of the stations. If the traffic could be brought into greater regularity it would assist the service, because there was great delay in moving these large cans from the stations.

Mr. CHESTER—Are the English milk cans single-skinned or not?

Mr. WOOD—Single-skinned. The linen covering over the French cans completely envelopes them; and being kept wetted, cooling is effected by the evaporation going on as they pass through the air. Possibly, the heat being greater in France than in this country makes such an arrangement for keeping the milk cool more necessary.

The CHAIRMAN—As soon as it could be proved that the milk could be brought to London in a satisfactory condition for the use of the consumers, it would no doubt assist the movement that was going on in many of the metropolitan parishes for the entire abolition of the London cow-sheds.

Mr. CAIRD remarked that it was the custom of railway companies to deliver certain goods; and he suggested

whether a sufficient rate might not be charged for the conveyance of the milk to cover the expense of delivering it to the consignees, under arrangements that would insure this being done as rapidly as possible after its arrival.

Mr. Wood saw no reason why the milk rates should not include delivery by the company.

Mr. Caird suggested that would probably reduce the cost of distributing the milk in London.

Mr. Wood hardly knew as to that, but as at present every owner of a milk walk had his own conveyance, the trade generally would have to be consulted.

Mr. Caird—Inasmuch as the different large milk dealers would receive their supply on their own premises, instead of having to send special conveyances of their own to take the milk from the station.

Mr. White suggested that, in the delivery of an article like milk, time was a very important element. The milk was required to be distributed in London at certain times to suit the trade of the retailers.

Mr. Wood—With regard to the speed of delivery, the people who went to the station for the milk would be likely to get it conveyed to their premises as speedily as possible. He did not think any arrangements of the kind suggested on the part of the company would expedite the distribution of the milk in London. He was disposed to think, if a very large development of the milk trade took place, some intermediate agency might spring up for the delivery to the dealers. Private enterprise generally springs up in such cases to provide what was wanted if the business was large enough to require it.

Mr. Chester—Is it found that in proportion as the quantity of milk carried on the Great Western increased, the quantity of butter carried on the line diminished?

Mr. Wood replied that he had no statistics of the quantity of butter brought by the railway from these districts, but he had no doubt the quantity of butter brought over that line, as soon as the extended communication with Ireland was completed, would be immense. At the present time very little fresh butter was sent up the line, but he believed sufficient butter might be sent from Ireland for the supply of the whole of London. At present barely any fresh butter reached the metropolis from Ireland; but when he told the committee that the value of the salt butter sold in Cork market, the year before last, amounted to a million and a half sterling, when quick communication between this country and the south of Ireland was established, it might be conceived that the enhanced price of fresh over salted butter would lead to the introduction of very large supplies of that article from Ireland into the metropolis. He believed any quantity of butter that was required might be had from the south of Ireland. The shortest sea-passage was from Milford Haven, but it was the longest land route. There was this peculiarity about Milford Haven, that it was not a tidal port. A trade in fresh butter from Ireland presupposed quick transit; and butter was an article that must be conveyed rapidly, and should be subjected to as little handling in trans-shipment as possible. When the new Metropolitan Market was opened next year, the railway arrangements in connection with it would be such that the produce of fresh provisions from the south of Ireland could be brought direct into the market without any handling at all.

Mr. C. S. Read—Does much fresh butter at present come to London from South Wales?

Mr. Wood—Very little, if any, butter was sent from that district, because the consumption was very large amongst the numerous population employed in the works of that district. They were importers rather than exporters of butter. Butter and provisions of that description were sent from Pembroke and Glamorgan to the works. The great producing country for all *fresh* provisions was Ireland; but private enterprise in the South hitherto, unfortunately, had not been much directed to that trade. The year before last he visited Waterford, to ascertain whether there was any large trade in the export of fresh butter from that place; but he found that although the quantity brought into the market was large, only one person was engaged in sending fresh butter from Waterford to London; but he believed that business was extending. Two new steamers were about to be put on that line; at present the steamers were not very rapid. There were rates for the carriage of butter on the Great Western Railway. Cork was the great market for salted butter, and the landed interest and country gentlemen there were very anxious to open out the fresh butter trade with this country. There was a great peculiarity in the butter trade of Cork. Both buyers and sellers of butter in the Cork market were subjected to the rules of the market. It was thought by some persons that those rules had a prejudicial effect upon the trade of the market, and an unsuccessful attempt was made last year to alter them. Law proceedings took place; the trial lasted nearly a fortnight, and the result was to uphold the rules of the market; so that at present the butter trade of Cork was exclusively in salted butter, from which all foreigners were excluded.

Mr. White—Would an English buyer, in this sense, be regarded as a foreigner?

Mr. Wood—Every buyer, whether Irish or English, was so regarded. The reasons were these:—The Cork butter was sold for export and shipping purposes; and to keep up the brand, all butter brought into the market was subjected to a certain test, and the casks were branded accordingly. There might have been reasons for the original introduction of these rules, but there were some people who thought they were now carried too far, and that they interfered with free trade. It would be a great boon to this country to establish quick communication with the south of Ireland for the fresh provision trade. The great difficulty was to establish steam communication, on account of the expense. His own company had not yet organised a service, because it was thought that the best time to introduce this produce would be when the new Smithfield Market was opened, to which access would be had by the railway, and he believed that would be completed in twelve or sixteen months from this time. The trains would then go in underneath the market, and the produce brought would be raised by lifts direct into it so that all the intermediate handling of the provisions, which was so prejudicial to them, would be obviated, and the produce would arrive in the finest possible condition. A prejudicial effect upon fresh provisions brought to London at present was produced by the handling between the arrival at the railway station and its delivery in the market, and that especially applied to the dead meat trade.

The Chairman—Would the New Smithfield Market include such articles as butter?

Mr. Wood—He believed arrangements would be made for trade in all articles of fresh provisions. Mr. Taylor, the Chairman of the Market Committee, would probably be able to give this Committee valuable information on these points.

Mr. Chester—Would any large traffic in Devonshire clotted cream be carried on on the Great Western Railway?

Mr. Wood said he had no details with respect to that.

Mr. White—Did Mr. Wood consider milk was more injured by being conveyed 100 miles than 25 miles?

Mr. Wood thought under proper management milk might be carried long distances without material deterioration. The limit of distance would be the cost of the carriage. He thought it would be only during a short period of the year, when the weather was hottest (if at all), that the linen coverings of the cans would be necessary, if the cans were completely filled so as to prevent the milk being shaken, and if they were carried in trucks which admitted a free current of air through them. If the London trade would be satisfied with one delivery of milk per day, the

traffic could be very easily managed; but at present two deliveries per day were required. There might, he thought, be arrangements for a milk train to run at night, and that would be a good thing during the very hot weather.

Mr. Chester inquired whether, in the opinion of Mr. Wood, it would be useful if the Society of Arts offered a premium for an improved milk can, and another premium for an improved milk carriage for the railways.

Mr. Wood thought it would be extremely useful, and it would no doubt lead to a good competition in both these matters. If that were done he had no doubt the people in the carriage department of his own railway would be competitors for the improved milk van. If this committee were now on the subject of meat he would suggest that good might be done by the offer of a premium by the society for an improved meat van, to be used on railways, because there was great difficulty in the structure of a proper meat van, and he had no doubt the offer of a premium would lead to some valuable suggestions. They wanted air and even temperature; but while admitting air they had difficulty in keeping out dust. At present there was difficulty in the carriage of meat on railways. If it was suspended, and the weight was on the top of the van, that was objectionable in rapid travelling by railway, from the vehicle being top-heavy. It was well known that fresh meat was very much deteriorated by frequent handling, and in any improved van he thought attention should be given to providing a means for obviating as much as possible the necessity for handling the meat in the transit from the railway to the market. The more untouched the provisions arrived in the market the better their appearance was. On the subject of the carriage of live cattle from Ireland and the Continent, Mr. Wood stated that, from the examinations he had made into that matter, he was of opinion that there must be soon a great change in the mode of conducting the transit of live animals. He had no doubt that the injury done to the agricultural interest of Ireland by the mode of transit of live stock was beyond what people would credit except those who had gone into the subject. The rapid passing of objects on a railway in the present cattle trucks had a great effect upon the brain of the animal, and no doubt that affected the state of the blood; and the way in which they were obliged to be arranged in the trucks for the sake of economy of space, had also a very deteriorating effect up onthe animals in a long journey.

Mr. White inquired whether Mr. Wood had the means of knowing to what extent an animal was likely to be deteriorated in weight by the journey from Ireland to this country?

Mr. Wood could not state what the loss of weight was, but he had been informed that dead meat sent from Aberdeen to the London market would remain good for at least two days longer than that of the animals which were brought from a long distance and slaughtered in London. He thought the powers of the Board of Trade, under the Coasting Passenger Steamers Act should be extended to the exercising of control over the cattle steamers; and that the cross-channel trade in cattle should be restricted to boats specially licensed for that purpose. There was, no doubt, a vast amount of cruelty to which the animals were exposed in the sea-passage; and he believed he quite spoke within limits when he said the cattle brought over to this country from Ireland suffered a great deterioration of their value. In conclusion, Mr. Wood stated that under arrangements which were now being carried out, he had no doubt a very large augmentation would take place shortly in the supplies of all kinds of fresh provisions from Ireland, and especially in that of fish.

The chair was then taken by the Right Hon. H. A. Bruce, M.P.

Mr. Nicholson, in reply to interrogations put by Mr. Chester and other members of the Sub-Committee, stated that he was chief clerk of the parcels department of the Great Western Railway Company, and was acquainted with the arrangements for the transit of milk, that traffic being under his charge. He was unable at the present moment to suggest any definite mode by which an improvement could be effected in the means of carrying milk from the provinces to London. The officers of the company wished to introduce smaller milk-cans, similar to those used in France. There was one of those cans now at Paddington, and he would send it for the inspection of the Committee. The farmers objected to those cans, because they were air-tight. The milk was put into the cans warm, and they considered it necessary to have air-holes to allow the steam to escape. He thought it would be better to put the milk into the cans cool, and fill them up, so as to prevent the churning of the milk by the shaking of the carriage. Some farmers placed the cans in a stream of water to cool the milk after they were filled, and before they were sent away. He believed the milk was put into the cans, in France, in a cool state. He presumed the cans would be placed in water to cool the milk, as was done by some dairymen in Wiltshire. The objection to the cans at present in use was their large size, rendering them inconvenient to handle. On the Great-Western line the sum of 2d. per can was charged for taking back the empties, and the dealers objected to having cans of half the present size because it would add so much to the expense of the carriage of the empties.

The Chairman said at present that was not so much the question as the effect which the carriage in the larger or the smaller vessel had on the milk itself.

Mr. Nicholson could not speak on that point. The objection to the present large cans, holding nine barn gallons, equal to eighteen imperial gallons, was their weight in loading and unloading, requiring two persons to lift them. The French cans were not more than half the size of the English. The milk was carried by the stopping passenger trains, and no trains had been put on specially for that traffic. The milk trains were those which arrived at Paddington at 4·30 a.m., at 12·30, and 9·30 p.m. and 11·10 p.m. Each dealer sent his cart to the station for the milk he required. The way the trade was conducted was, all the milk that was sent up by the farmers was consigned to several wholesale dealers in London, who on its arrival sold to the retailers the quantity they required, and they took it away in their own conveyances, and he believed for the most part in their own cans, so that most if not all the cans that came up were emptied without being taken away from the station; they were then sent to the other side of the line and returned as empties. There was no competition for the milk amongst the salesmen at the station, the price being agreed to amongst themselves, and the whole quantity being consigned to them. It was not what could be termed a milk market at the station, as there would not be sufficient accommodation for that. Each salesman appeared to have his regular customers each day. The French milk van was like a narrow-gauge sheep truck with two tiers. He believed there would be great objection to a sudden change in the size of the cans, owing to the expense of providing new cans of half the size, as the present stock of cans was very large and would last for several years. He believed the milk cans now used would last for five or six years with occasional repairs. The French cans were made of stouter metal than the English, and inhot weather they were covered with a linen cover to keep the milk cool during the journey. He could not say whether the cans in France belonged to the railway companies or not, or whether the milk was distributed by them on its arrival. The principal supplies of milk on the Great Western Railway were from the neighbourhood of Swindon, Purton, and Cricklade, and that was the longest distance from which it was brought into London, being from 70 to 100 miles. Swindon was the principal station from

which the milk was taken. The effect of the cattle disease was to cause a larger quantity of milk to be sent by the railway on account of the disappearance of the cows in London. The trade was not increasing at the present time, but rather the reverse. He attributed that in some degree to the competition of other railways. Large quantities of milk were brought up by the London and North-Western and the South-Western; also by the Great Eastern.

Mr. Chester—The railway which afforded the greatest facilities for this traffic would be likely to have the largest trade in that article.

Mr. Nicholson said the Wiltshire milk was esteemed for its excellent quality, and had a preference with many of the dealers. He was not in possession of any particulars with regard to the traffic in butter on the Great Western Railway. He regarded the question of the reduced size of the milk-cans as important, not only for the convenience of handling by the railway porters, but also for the conveyance of the cans from the farm to the station. The milk would be less shaken in cans of a size that a man could carry than in the present large cans, which were wheeled about on the edge of the bottom, and there would, he thought, be less damage to the cans themselves. There was no provision made at the stations for receiving the milk from the farmers beyond the cans being placed on the platform to await the arrival of the train that took them on. The change from the larger to the smaller cans would occasion great inconvenience to the traffic, unless it were done uniformly throughout the trade, and at once, as the same quantity of milk had to be carried whether it were carried in large or small cans, and a truck that would be adapted for the larger cans would not be available for the smaller size without great waste of space in the height of the truck. With two sizes of cans two descriptions of trucks would be required, and that would tend to obstruct the traffic rather than facilitate it. If the railway companies decided to insist upon the small cans being used entirely, it would be necessary to give the farmers and dealers at least three or four months' notice of that intention. It was quite necessary that the change, if adopted, should be general. The number of separate cans in use on the Great Western Railway, in the month of January, 1866, was 11,539. On an average there were about 500 cans carried to and fro daily. The cans were of the value of about 32s. each when new. There would be, he imagined, somewhere about 2,000 cans in use in this trade on the Great Western Railway, as it was necessary for the dealers to have a reserve of cans. They generally put into each can only eight barn gallons, but they mostly held nine gallons. He thought the reduction in the size of the cans would not reduce the rate at which the milk was carried on the railway, inasmuch as on the arrival of the train at the stations it was the rule for the milk dealers' men to assist in loading the cans, as it enabled the train to start away quicker. The French cans were of much thicker metal than the English, being something like galvanized iron; but if the English cans were made half the size, they would not require to be made so strong in proportion as the present large cans in use; and they were strengthened very much by tin hooping round them. They were from four to five feet in height, and not uniform. He should say the introduction of small cans would be a decided improvement in the milk traffic on railways. The milk brought up to Paddington was principally sold to about ten dealers, and there were thirty or forty retailers' carts ready to take the milk away on its arrival, after it was sold by the dealers. He did not think the distribution of the milk over London could be effected quicker than in that way.

The Chairman inquired whether Mr. Nicholson thought it would be too harsh a measure to give notice to all the milk producers that, after a certain time—say six months—no milk would be carried by the railway except in cans of a certain size?

Mr. Nicholson replied it might have the effect of driving the trade to another line from that which adopted that course. It was generally found that the railway which gave the greatest facilities for traffic got the largest trade. There were other railways which competed with the Great Western in certain districts. The South-Western was a competing line, and also the London and North-Western at Aylesbury, &c. The Great Western had the command of the district of Swindon, Purton, and Cricklade. If a decision were come to by the company to insist upon a smaller size of can being used, the notice, in his opinion, ought not to be less than three months; but it was a question whether other companies would consent to impose such restrictions. It would be an advantage to every company to have the smaller cans used, as they could be loaded and unloaded quicker. The great bulk of the milk brought to Paddington did not come from a greater distance than 70 or 80 miles.

Mr. Le Neve Foster remarked that, according to returns sent to him, it appeared that the greatest distance from which it was brought by the South Western was from Wareham and Salisbury.

Mr. Nicholson added he thought it would be expedient to have special trains for milk if the trade sufficiently developed itself, and carriages had been specially fitted up for the milk trade on the Great Western line; old carriages had been converted for the purpose: but he thought, with Mr. Wood, that good would be done by the offer of a premium for an improved construction both of vans and cans for the carriage of milk. As he had stated, an admixture of large and small cans together would be productive of great inconvenience in the loading of the trucks. The milk trade to London had always been of an uncertain character, and had only sprung up on the Great Western line to any extent since 1865. A very large quantity was sent up last year, but at present it appeared to be falling off, and might continue to do so as the stock of cows in London and the neighbourhood increased. At present he did not see his way to any great practical improvement being effected in the milk traffic to London. No doubt the great increase in the quantity of milk sent up in 1866, was owing to the deficiency of the supply from London itself, and as the local supply was increased, the provincial supplies would probably decrease. The returns for the two months expired in the present year, showed a considerable falling off in the quantity as compared with that of the corresponding period of the previous year.

Cantor Lectures.

"On Music and Musical Instruments." By John Hullah, Esq.

Lecture VI.—Monday, April 8.

Mediæval Instruments, &c.

After briefly alluding to some statements which he had made in his fifth lecture, respecting the different classes of instruments, Mr. Hullah proceeded to speak of the condition of these instruments, of the changes they underwent, and the additions that were made to them during the middle ages. The conquerors of the old world—the barbarians who broke up the Roman empire—found everywhere in the south of Europe specimens of ancient musical instruments, and artists skilled in the use of them. These remained in use for a considerable time. But the same influence which acted so strongly on the religion, politics, manners and customs of the south soon made itself felt on the arts. For our knowledge of mediæval instruments we are as much dependent on pictorial and plastic representation as in the case of those of higher antiquity; but happily, more of this representation has come down to us. Of the instruments themselves, few anterior to the 15th century remain. But for the notoriously irreverent spirit of the Renaissance, the

all but total disappearance of things made of such durable material, so strongly put together, and taking up so little room as many of these instruments, would be unaccountable. Few even of the beautiful organ cases of the best period of Gothic art have come down to us. Posterity however, has dealt with the Renaissance instruments as the Renaissance artists dealt with those of their predecessors. Specimens of some, no longer in vogue, of the 17th and even of the last century are hard to find. Who, for example, has seen a chest of viols, once an indispensable complement to a well-appointed household? Even the harpsichord is as unknown to the present generation as the shalm or the arch-lute. But if the instruments have, for the most part, perished, we have abundant evidence of what they were in the beautiful sculpture, illuminated books, and decorated walls and ceilings cotemporary with them, and also in descriptions by the theorists, who wrote while they were in vogue. The diagrams on the walls were, Mr. Hullah said, selected from such sources, which were always thoroughly reliable; for no mediæval artist ever dreamed of leaving out what he saw, or putting in what he did not see, for the sake of effect. From mediæval monuments we learn that several instruments in use in the south at the time of the earliest immigrations of the northmen, were adopted by them; and that others, differing in form from these, and even indicating new methods of producing musical sound, were in use before painters or sculptors attained or recovered sufficient skill to represent them correctly. Among wind instruments the trumpet is most frequently found in representations of the manners and customs of the northmen. The first trumpet was, no doubt, literally a horn (*cornu*). In dimensions, these instruments varied considerably. Some were small enough to be held by the performer, others equalled him in height, and almost in bulk. Their pitch would of course vary with their dimensions. In timbre they probably resembled our trombone. In a MS. antiphonary of the 9th century there is a drawing (a copy of it was on the wall) of a trumpet in which the tube is folded back, and in which there is an indication of a slide, the characteristic member of the sackbut, the precursor of the trombone. Though the traverse flute was known even to the Egyptians, the flute-à-bec seems to have been used exclusively during the middle ages. Mediæval, like more ancient flutes, were single and double, and the same uncertainty prevails as to the tuning of both. Mediæval writers often include under the name *flute*, instruments which must have had more resemblance to the oboe; since they consisted, not of a single pipe, but of a pipe enclosing a vibrating tongue, or reed. Such instruments were sometimes distinguished as recorders. Of the flute there were in England in early times several different sizes, for playing in concert, the largest of which was probably six feet in length. The quality of these instruments must have been sweet, but their intensity very limited. In the reed instruments the tone was produced by the vibration of single tongues, or by the beating together of pairs of tongues. The former is the simpler, and probably the earlier form, the calamus, or typical reed of antiquity. Indeed the most important of mediæval single-reed instruments bore a name derived from that of its prototype. The word shawm, or shalm is obviously connected with the French *chalumeau*, the Latin *calamus*, and Greek καλαμος. The shawm, frequently mentioned in our translation of Scripture, was the ancestor of the clarionet, which, before the latter part of the last century, was a military or out-door instrument, as would seem to have been the shawm, and indeed all the reed instruments of the middle ages. So with the oboe, now essentially a concert instrument. The plays of Shakspeare abound in directions for the introduction of the oboe on the entry of great personages, and in battle scenes it is often coupled with alarums. In England the oboe was called also the wayte, a word applied to watchmen, part of whose duty it was to pipe the hours of the night. There was a considerable variety of oboes—an oboe d'amore, and an oboe da caccia, the compass of which was nearly the same as that of the cor anglais, or corno inglese, still frequently used for obbligatos. But the favourite reed instrument of the middle ages was the bagpipe, which is by many supposed to be peculiarly a Scottish instrument. This is a great error. The bagpipe, of immense antiquity, has been found among nations more remote, and, seemingly, more unconnected with one another, than any instrument demanding the same skill in its construction. It was known in ancient times all over the East, in Greece, and in every part of Western Europe. It has flourished, however, most in mountainous countries. The peculiarity of this instrument consists, not in the pipe, which is simply an oboe, but in its accompaniment by a pair of *bourdons* or drones. In the Scottish Highland pipe these are monotonous—the tonic and fifth of its natural scale; but in the Calabrian pipe they are capable of some little variety. Another peculiarity of the instrument—that, indeed, from which it derives its name—is the bag, which is not generally a pair of bellows, but merely a receptacle for the breath of the player. Mr. Hullah then proceeded to speak of mediæval stringed instruments. The lyre appears on many monuments of the middle ages. In the first centuries of the Christian era everything associated with Paganism was avoided and repudiated by the Christians. The musical instruments of the old world, necessarily associated with Pagan worship, would be regarded by them with horror; and even music itself must have run some risk of rejection. But the same practical spirit which could adopt the Basilica as the model of the Christian Church, and, a little later, symbolise Christian truth by heathen fable, would not be long in turning to account an art said to have wrought such wonders in heathen times. The lyre, the embodiment and personification of ancient religion, poetry, and music, appears often in the illuminations and sculptures of the middle ages. Even as late as the thirteenth century its form was nearly the same as eighteen hundred years before. But, whatever the conquerors of the Old World may have learnt from it in other arts, in music they were competent to be rather teachers than learners, for they brought with them not merely instruments of the same principle and structure as those they found, but others unknown to the south of Europe, and, more than all, harmony, polyphony, music in parts, —an art and science, acquainted with which or not, the ancients never turned to account. Of the instruments brought in by the northmen the harp was the most important. Though probably known to the Romans, as it had been to the Greeks, it had never been adopted by either. How and whence the northmen got this instrument, is one of those historical or ethnological problems which will never be satisfactorily solved. It may have travelled from the East, across the north of Europe, or have suggested itself to such passionate lovers of music independently. Certain it is that the harp attained considerable perfection among our Anglo-Saxon, and even British, forefathers; and that both the instrument itself, and the art of performing upon it, were held in the highest honour among them. Moreover, harp is essentially a barbaric word. It appears, slightly varied, in Anglo-Saxon, Icelandic, Danish, and German. The Latinised form, *harpa*, first appears in a poem by Venantius Fortunatus, who wrote in the 6th century; it is not to be found in any ancient Latin writer. Schoolboys are taught to render *cithara* by harp, but there can no doubt that guitar is the closer translation. The mediæval harp was a portable instrument, small enough to rest on the player's knee without hiding his face; an important point when he was not merely a player, but a singer and an actor, often a poet, who would address himself as much to the eyes as to the ears of his audience. Moreover, the nomadic life of the minstrel would have rendered a cumbersome instrument all but useless to him.

The pole or bar is a characteristic of the Gothic harp, which essentially distinguishes it from the Assyrian or Egyptian. The necessity for it originated no doubt in the different material of the string in the two instruments. The Egyptian strings were of vegetable fibre, silk or gut; the Gothic generally of wire. Gut strings, though known in the middle ages, were not generally adopted till the seventeenth century. Mr. Hullah then directed attention to several drawings of mediæval harps, among them the earliest extant, which is from a MS. of the 9th century, formerly in the monastery of St. Blaise, in the Black Forest; another, a quadrangular harp, also of the 9th century, to which the name psaltery or psalterium is sometimes given. It is always found in the hand of David in MSS. between the 9th and 11th centuries, after which we find it replaced by the harp proper. He also exhibited drawings of psalteries of the triangular form in use from the 12th to the 16th century. The origin of this instrument was said to be eastern, and the name to be derived not from the Greek Ψαλλω, to sound, but from the Arabic *santir* or *pisantir*. A similar instrument is still in use in the east, but the strings are struck, not, as in mediæval Europe, plucked. Though not so picturesque as the many-stringed instruments, stopped instruments—those having finger-boards—are incomparably more important; not so much in themselves, as in their closer connection with the violin species, the use of which has so enormously influenced modern music. The finger-board, as was shown in the last lecture, is probably three thousand years old; but the most ancient western monuments of its existence are not older than the seventh century. It has been thought that the guitar species disappeared from Western Europe for some centuries, and was re-introduced with the Crusades. The mediæval *cythara* was not a guitar, but a harp. Stopped instruments are of two forms:—(1) with rounded pear-shaped backs, (2) with flat backs. The type of the first form is the *lute;* of the second, the guitar. The invention of the latter is generally attributed to the Arabians. Its Arabic name is *coud*, which, by the prefixing of the article has become *laoudo* in Spanish, *leuto* or *liuto* in Italian, *luth* in French. Mr. Chappell, with characteristic patriotism, derives it from the Anglo-Saxon *hlud* or *lud*, *i.e.*, sounded. Once the most popular of domestic instruments, the lute has been superseded by its inferior relative, the guitar, which, in its turn, has greatly declined in general use and estimation. Mr. Hullah then called attention to two drawings of the *mandora* (whence the more familiar *mandolin*), a species of lute, and a small Moorish instrument of the same kind; and two so-called *Latin guitars*, one of which presented the nearest approach that an instrument could make to a violin without being one. It had sound-holes, sides indented, or *échancrés*, and apparently a bridge. In conclusion, he announced that he had been invited to conclude his course (which he had found impossible in the time prescribed) by giving two additional lectures, on the 29th inst. and the 6th May. In these he proposed to deal with the instruments of the violin species, and the combination of wind and stringed instruments in the modern orchestra.

Eighteenth Ordinary Meeting.

Wednesday, April 10th, 1867; Clifford Wigram, Esq., in the Chair.

The following candidates were proposed for election as members of the Society:—

Bailey, John, 163, Oldfield-road, Salford, Manchester.
Blacklock, William, J.P., Hopefield, Pendleton, Manchester.
Burton, Oliver, Tyldesley, near Manchester.
Henson, Henry H., Rutland-lodge, Watford, and 13, Parliament-street, S.W.
Sandbach, Wm. Robertson, 10, Prince's-gate, Hyde-park, S.W.

And as Honorary Corresponding Member,

Nobile, Signor Commendatore Gaetano, 14, Via Salata ai Ventaglieri, Naples.

The following candidates were balloted for, and duly elected members of the Society:—

Cassels, Andrew, Manchester.
Eadie, Robert, Blaydon-on-Tyne.
Mendel, Sam, Manchester.
Pagan, John T., J.P., Oak Lodge, Guildford.
Rydon, Horace James, Pyrland House, Highbury New-park, N.
Tolhurst, John, 152, Tooley-street, S.E.

The Secretary called attention to a new form of portfolio stand, or table, invented by Mr. McLauchlan. For description see page 333.

The Paper read was—

ON THE OPERATION OF THE CHAIN CABLES AND ANCHORS ACT, 1864.

By Robert Galloway, Esq., C.E.,

Chief Surveyor of Steam-ships, and Examiner of Engineers; and Inspector of Proving Establishments, Apparatus, and Machinery.

The two questions that I propose to discuss this evening are:—

1st. Is the test rendered compulsory by this Act a proper test? and,

2nd. Is it sound policy for the Government to institute any compulsory test?

The Chain Cables and Anchors Act, 1864, which is a fair specimen of that class of legislation that does at once too much and too little, is known as an Act for regulating "The Proving and Sale of Chain Cables and Anchors." It received the Royal assent on the 23rd June, 1864. It was passed, as stated in the preamble, on the grounds "that it is essential for the better security of lives and property afloat on sea-going ships to make provision for the proper testing of chain cables and anchors."

With the view of ensuring this "proper" test of chain cables and anchors, it provides: "That any corporation, public body, company, person or persons erecting any proving establishment, apparatus, and machinery suitable for testing chain cables and anchors, may be licensed by the Board of Trade." The Board of Trade have power to appoint an inspector of proving establishments, and "may" license any establishment which that inspector certifies as being suitable for testing chain cables and anchors under the Act. These licenses are renewed (after inspection) annually.

Here we have all that is required of the Government and their inspector. It is well that we should understand this point at once and thoroughly. The inspector is required to inspect the establishment, apparatus, and machinery. If and when he is satisfied that it is suitable for testing chain cables and anchors, under the Act, he gives a certificate to that effect, and has done with it—unless and until the owner wants his inspection again next year. The inspector merely inspects for sufficiency once a year, and his duties and powers end. The duty of the Board of Trade is simple enough. It is defined in a very few sections. It has power to appoint an inspector; to charge fees for licenses; to grant and renew licenses on receiving certificates from the inspector; to remunerate the inspector; to approve of proof marks; to fix a scale of charges for proving—and that is all. In short, as far as the Government are concerned, it has had to settle the scale of fees; to approve of the proof marks, and to determine the conditions necessary to be complied with by proprietors of proving establishments to satisfy the Inspector that a machine can exert the strain required by the Act. Having done this the Government are not required, nor are they authorised or em-

powered, to do anything more than issue certificates annually on receiving reports from the Inspector.

The next thing for us this evening is to understand the duty imposed on the tester. It is his duty to see that chain cables and anchors which may be brought to him for the purpose are "tested" in their proper turn, and if they stand the test then he is required to stamp every five fathoms of chain and every anchor to denote that they have been "proved." The tester has a right to certain fees for testing, and has power to detain the property until those fees are paid. He is also required by the Act to give a certificate of proof, free of charge, within one month after a cable has been tested.

Any persons improperly stamping, or assisting in stamping a chain cable, &c., or counterfeiting proof marks, are liable to be punished, if it can be proved that they have done so for the purpose of, or with the intention of, passing it as a chain cable, tested and stamped under the Act; and any person giving a certificate of proof, under the Act, for a cable or anchor that he knows has not been proved is also liable.

The chances of conviction, under this clause, depend on proving the "intention" of the fraudulent marker, the "knowledge" of the fraudulent seller, and the "knowledge" of the forger or issuer of certificates for untested chains and anchors, and on proof being produced that the chain is supplied to be used as part of the equipment of any ship or vessel. As regards the seller and dealer in anchors and cables, the Act provides that it shall not be lawful for any maker of, or dealer in, chain cables or anchors to sell or contract to sell "for the use of any ship or vessel" any chain cable whatever, or any anchor exceeding in weight one hundred and sixty-eight pounds, unless they have been tested and stamped under the provisions of the Act; and any person selling a cable, &c., fraudulently marked, and knowing it to be so wrongfully stamped, is to be punished. So that to get a conviction it is necessary to prove first that the anchor or cable is supplied for the use of a certain ship or vessel, and secondly, the knowledge of the fraudulent seller.

The last clause, and one which the opponents of the Bill look on as the best clause of all, provides that the Act shall not remain in force beyond the 1st February, 1872.

To sum up, the Act requires all cables, and all but very small anchors, to be tested at a machine licensed by the Board of Trade. That machine may be the property of an independent corporation, or of a manufacturer. A tester may test his own cables and anchors, on his own works at machinery of his own, and by his own workmen, and then himself give a statutory certificate of public proof. The Act provides for an annual inspection, and an annual licensing of machines, and imposes penalties on persons not complying with its provisions. Is not this at once too much and too little?

We have seen what the Act does provide for, and we will now see what it does not provide for, or, if it provides for, does not secure. The Act does not empower any person or department to see that its provisions are complied with. The Board of Trade have no power or authority whatever to prosecute for offences under the Act, and have no funds at their disposal out of which to institute prosecutions, and the manufacturers, and buyers, and sellers of chain cables will not prosecute. It of course rests with persons aggrieved to take steps for themselves, but they have not done so yet. No provision is made for punishing any person who tampers with a proving machine after it is licensed by the Board of Trade. The Inspector gives his certificate when he is satisfied that a machine can do a certain amount of work if fairly and honestly used, but any one can alter that machine after it is licensed so as to make it exert a lighter strain than intended. It should therefore be unmistakably understood that at present the Board of Trade license is only a guarantee that the machine can do a certain amount of work, but is no guarantee at all that it will be required to do so, or that cables tested at it will be tested to the strain required by the Act, or will be tested to any given strain.

The Act does not insure an independent test. However honest a man may be, he ought not to be allowed to test his own articles for certificates of public proof; and, without in the slightest degree impugning the honesty and integrity of any person, one may fairly say that so long as a maker, be he ever so honest, is allowed to test his own chains for a statutory certificate of proof, the Act is not satisfactory.

But assuming, as is without doubt the case, that every establishment licensed under the Act is honestly worked, whether public or private, whether under separate management, as at Birkenhead, or at Low Walker, or whether in the premises of, and under the sole control, guidance, and management of, the manufacturer himself, the question still remains whether the test required by the Act is itself the proper test. We must now consider what that test really consists of, and for this we must refer to the Act,—Section 7. That section provides that—"Every tester shall, with all reasonable despatch, subject every chain cable or anchor, that shall be brought to the proving establishment of such tester for the purpose of being proved, and (unless the parties interested may otherwise agree) in the order in which such chain cables and anchors respectively shall be so brought, to the same tensile strain as that to which chain cables and anchors respectively of similar size, weight, or description are or shall be subjected before being received for the use of Her Majesty's naval service." From this it will be seen that the only test required by statute is a "tensile strain," or, in other words, a direct pull of a certain amount, varying with the size of the chain.

Having seen that the only test is a direct "tensile strain," we must next notice that that "tensile strain" is not regulated by the quality of the iron of which the chains are made, but solely by its thickness. In other words, the test as it is now applied, is applied on the false assumption that strength and thickness are convertible terms, or in other words, that iron of a uniformly good and high quality is used in the manufacture of all cables.

Authorities on the subject of the strength of iron and iron work lay it down as a rule that the proof strength and working stress should bear a certain fixed proportion to the ultimate strength and to each other; and that these proportions can never be departed from without risk. Now, assuming (without admitting or denying) that the proof or Admiralty test legalised by the Act we are now considering, is, or was, determined by, and bore a fair and proper proportion to, the ultimate strength of the material used at the time for cables, and that that test was the proper test for the particular quality of iron of which chains were made when the proof was established, does it follow that it is the proper test now?—and the best for all sorts of iron, whatever their quality? Does it not rather show that it is only a proper proof for the iron of the quality for which it was established? And is it right now to apply this proof indiscriminately to all sorts of iron, bad or good?

To make my position clearer. We know that when a minimum scale, or quality, or size, or proof is fixed by the Legislature, that minimum very soon becomes the practical maximum; that when a standard of minimum strength or thickness is once fixed it is worked up to, and so long as that minimum strength is arrived at, or that thickness attained, the Act is complied with, and the article or building passes muster, and gets a certificate, without reference to other and perhaps more important considerations. Now it so happens that iron manufacturers and chain cable makers are the cleverest people in the world for producing an article that will stand a certain test. It is no part of

the business of the manufacturer of cables to ascertain that the ultimate strength should be so much more than the proof strength, and the working stress so much less. All he has to do is to comply with the provisions of the Act and to take care that his cables will stand the proof, and he can do this to a nicety.

Professor Rankine, in his work on applied mechanics, shows:—That for wrought iron boilers the proof strength should be half of the ultimate strength, and the working stress one-eighth of the ultimate strength, or one-fourth of the proof strength. As regards wrought iron, for steady loads, that the proof strength should be half of the ultimate strength, and the working stress should be one-third of the ultimate strength. We here see that proof strains should bear a certain proportion to the ultimate strength and working stress of the material proved, and as the Chain Cables Act does not provide for this, such a test in the case of chain cables is fundamentally and radically wrong. The manufacturer may make a chain that will stand the proof, but will break at 10 per cent. above it. In this case the ultimate strength is only 10 per cent. more than the proof, instead of being, as it ought to be, far more. In such a case the iron is tried beyond the limits of elasticity and the cable is ruined, and it is rendered but a poor weak thing, ready to part on any sudden stress or strain being applied.

The answer then to my first question, whether the test required by the Act is a proper test, is that no test can be a proper test that is not regulated by the ultimate strength of the material tested, and that as the test required by this Act is not so regulated, it is not a proper test.

The second question for consideration is, should there be a compulsory test?

The result of the working of the present Act is stated, in papers presented to Parliament, as follows:—

Messrs. Lamport and Holt to the Secretary of the Board of Trade.

Liverpool, 11th February, 1867.

Sir,—We venture to take the liberty of calling your attention to the unreliable character of certificates of the testing of chains and anchors given under the provisions of the Act of Parliament. Confining ourselves to our own experience, and beginning with the month of November, 1865, no less than seven cases have occurred of the breaking of new and duly certified chain cables in use on board steam vessels of which we are owners. In all these cases the certificates were such as would comply with the requirements of the Board of Trade surveyors. The latest of these cases, that of the screw steamer "Donati," which happened in the river Mersey on the 8th inst., affords means for minute inquiry into the circumstances, in the event of your considering the subject sufficiently important for such an investigation. This steamer was supplied with two cables, 150 fathoms each, of $1\frac{9}{16}$ inch chain. A copy of the testing certificate is enclosed herein. Both cables broke successively, almost immediately after the anchors were dropped, and while there was but little strain upon them. One of the cables had never been used before; the other had been used only once before. We may be forgiven for adding that so many cases of broken chains had not occurred to us in our previous twenty years' experience as shipowners.—We are, &c.,

(Signed) Lamport and Holt.

J. J. Lawrie, Esq., to the Secretary of the Board of Trade.

Glasgow, 16th March, 1867.

Sir,—As it is probable that measures will shortly be adopted to amend the Merchant Shipping Act, 1854, I am anxious to mention to you the following matter of an analogous kind, and of great interest to the shipping interest. Since the Chain Cables and Anchors Act, 1864, came into operation, by which the chains and anchors of ships must be subjected to certain proof strains, defined in that Act, before they can be used on board ships, the number of accidents caused by the breaking of the cables has been very much greater than before the passing of that Act. I am certain that I understate the facts when I say that for one case before the passing of the Act in which the cables were broken in the riding of the ships, there have been ten such accidents since the Act came into operation. The inference that has been drawn from these accidents is, that the cables are heart-broken in the process of being proved, and that the Act either requires too great a proof strain, or is defective in not providing that the iron of which the cables are made shall be of a quality that will sustain, without injury, the specified proof strain. This feeling is becoming so strong that for the safety of the ship it is now considered very undesirable and unwise to subject the rigging chains to a proof strain so great as that specified in the Act for cables. It is certainly most important that cables and anchors, and indeed all the chain used on board ships should be proved to be well made and of good iron, but for that purpose other means, I humbly submit, should be employed than those specified in the Act.—I am, &c.,

(Signed) J. J. Lawrie.

Now, without endorsing these statements to the fullest extent, there is, I think, abundant proof that the test imposed by the Act has been the means of introducing inferior iron more generally into use than formerly. I do not say that this would be the result of a proper test, but I think that it is the result of the present test. It may fairly be admitted and assumed that a proper test and a proper examination are necessary, and that the aim and object of the Government should be to ensure such a test; and it cannot be denied that no cable or anchor ought to be used on board a ship, or insured by underwriters, unless and until it has been properly tested, examined, and certified. We cannot give Mr. Laird and the promoters of the Bill too much credit for their philanthropic designs in trying to get a proper test. Here we shall all agree, but the question is—how should that proper test and examination be secured? Here we are likely to find a difference of opinion. There are some persons who would wish the existing Acts to be made more stringent, to give the Government further powers of supervision and inspection, and powers to prosecute and recover penalties. There are even some who would go so far as to make it felony to sell an untested chain. On the other hand, there are those who are for doing away with the compulsory test entirely, and for giving buyers and users an easy and effectual remedy against sellers of bad chains.

To speak broadly, there are two opposing parties:—the one wish the Government to do all the work of supervision, and to take all the responsibility; and the other wish the Government to take their proper place as chief policemen, and to leave the responsibility where it ought to be left—on the shoulders of the persons most interested, viz., the buyers, users, and sellers of cables, and the public. Those of the former school are a very numerous class, and those of the latter school include men of careful habits of thought.

Our object to-night is to raise discussion; I propose, therefore, to take the side of the opponents of undue interference on the part of the Government. In a hall like this, where men of intellect, and capable of reasoning "most do congregate," it is well to raise a direct issue, and to have an argument. It matters little whether the person raising it is right or wrong. The great point is to raise an issue, and to invite discussion, so that, through that, we may arrive at truth. I then—with this object in view, as well as from firm conviction—will say, that a compulsory test is bad and vicious in principle, and should not exist; and I call on

any person opposed to this view to express his opinion openly, and to controvert it.

After raising this direct issue, I have but little to do before sitting down and listening to the opinions of those gentlemen who may favour us with a statement of their convictions and conclusions, and of the grounds or process on and through which they have arrived at those convictions and those conclusions. I have only now to say that I think that public security would be ensured, and the objects of the promoters of the Act would be gained, if public corporations alone were allowed to test chain cables for certificates of public proof. I would, however, not have that proof compulsory, but would have it more effectual than compulsory proof. I would make it to the interests of all parties concerned to use good iron and good workmanship; and I would, as Mr. Gray stated, in his paper, read in this room in February,* 1866, and, as I believe, had already been suggested by the Board of Trade, do this simply by authorising the Board of Trade to licence public machines, and regulate the nature and extent of the test, and then leave it for the buyer to have his chain tested at a public machine, at the expense of the seller. We should have then but few bad chains; and it would be to the interest of all persons to make, provide, sell, underwrite, and use good chains without the assistance of any compulsory legislation at all.

Unless something is speedily done, we shall, according to opinions pretty frequently expressed, be placing our merchant ships in a far more dangerous position than they were before the passing of the Act.

Gentlemen, I thank you for the attention you have given me, and call on you to express your opinions in a plain and unhesitating manner.

DISCUSSION.

The Earl of Caithness said he looked upon the question brought before them by Mr. Galloway as one of vital importance to the country at large, and, indeed, to every country in any way interested in maritime affairs. He did not like to say he was positively against it, but he certainly was not much in favour of the compulsory testing of chain cables. At the same time he thought it was very important that a chain cable should be tested, because, as every link was welded, it seemed necessary that there should be some means of ascertaining whether every weld was perfectly good; but to test a cable to anything near its breaking strain was, in his opinion, a great mistake, because then the ship had nothing left to do but to break it, and when a ship was lying to in bad weather, they all knew that the strain was not of the most gentle or even character. The cable would not stand such a strain as that when it had been half broken previously, all the elasticity of the iron being destroyed, the fibres being torn, and, he might almost say, disintegrated. He was afraid, also, that the best material was not usually put into chain cables at the present time. John Bull liked to put a shilling into his pocket when he could, as well as anybody else, and he did not blame him for doing so, but when it was a question of life and death, and of such a vast amount of property, as was involved in the safety of a ship, the very best material ought to be used. He would urge upon any one who had anything to do with shipping not to have his cables tested to anything like the breaking strain. Not being himself an engineer, however, he offered his opinion with some diffidence.

Mr. Betterley said that he should like, having been connected with the making of chains and anchors for the best part of his life, and having made the largest anchor in the world for the Great Eastern, to give the result of his experience. The first question was, whether the testing of chain cables should be compulsory or not, and, as far as that was concerned, if there were such a thing as a proper test he would readily agree to it; but the fact was, that all the Act had effected was not a government proof of the chain cables themselves, but only of the machinery for testing them. Some of these machines were examined to such a degree of nicety that they would almost prove a chronometer, and the expense the country was put to in consequence was enormous, whereas he (Mr. Betterley) could put up machinery for £150 which would test any chain cable, because nothing was wanted but a hydraulic press. Then came the question, who was to examine the chain and give a certificate respecting it. It was true that a government inspector had passed the machinery, but his duty did not extend to the examining of cables. The person who did this had no certificate of competency; he might be an engineer, a chain maker, or, indeed, anything else; anyone who was well recommended might get such an appointment, which was worth perhaps £3 per week. Some firms paid as much as £50 a week for proving, and it would be well worth their while to pay an additional £5 a week to get their cables passed. The present compulsory test really involved an expense of about £1 per ton, for there was not only the expense at the proof-house, but the carriage to and fro, and this amount was really so much taken from the value of the iron which was put into the cable, so that in fact people got worse cables for their money. Cables had been proved and certified in Staffordshire, and when they went down to Liverpool they had been found to break. The certificate said that the cable had been proved to a certain point, and, as Lord Caithness had well observed, the ship had often nothing left to do but to break it. But not only did this law add £1 a ton to the cost of the cable, but it led to the manufacturers getting a Government certificate for their "proof-house," whether or not it was rightly used afterwards. This was just like building a stable, and getting an architect to certify that it was properly erected, but having no certificate as to the soundness of the horse it contained. As to the welding of the links, they did not require any Government inspector for that. He maintained that the machinery for trying the men's work, whether it were sound or not, was as much a portion of the machinery of the shop as anything else in it. It was the business of the master to ascertain whether the work was sound, but if they were to go further, and seek to ascertain if the iron were good, they must pull the chain to pieces, and if that kind of proof were required all the cables would be destroyed. He was in favour of the cables being tested by some person thoroughly competent to examine them, who should be allowed to take out two or three links wherever he thought proper, and strain them until they broke. Then he could give a certificate that the iron in such a cable stood such a test, and if it did not stand 50 per cent. more than the present proof he should not give a certificate at all. He thought that by such means they would get good cables. All this was a matter of indifference to some classes of shipowners; in fact, there might be said to be a premium offered to them against good cables, because, in many cases, they could recover more from the underwriters than the value of the vessel. There were many cleverer swindlers than the man Houldsworth, who bored a hole in his vessel; many a clever scoundrel would prefer to buy a cheap cable, that did the business quite as well as the auger. Therefore, it was a serious question for the underwriters to consider, whether they would insure chain cables at all, so that if a ship broke her anchor or chain they would not hold themselves liable, or, at least, would reserve the right to deduct so much from the insurance. That would make it a necessity with the shipowner to provide good ground tackle. The whole value of a ship, perhaps half a million, often hung on a chain with a thousand links, and the weakness of one would destroy the whole. It was the interest of the underwriter to look after these things, and the question then arose whether the Government should step in and protect the underwriter, or whether the underwriter should protect himself.

*See *Journal*, Vol. XIV., p. 246.

Mr. T. M. Gladstone said the subject before them had long been familiar to his mind, and he was one of those who had taken a part in bringing about the present Act. The question now raised, whether the test provided by that Act was a proper one, he would himself answer in the affirmative. This kind of test had long been used in the Admiralty dockyards, and when it was found that the cables supplied to the Royal navy were fifty per cent. better, at the very least, than those generally used in the merchant service, he thought it might be considered a fair argument that a compulsory test, whereby the same high quality should be secured in chain cables generally, would be a step in the right direction. This test indicated something like two-thirds, or less, of the strength which might be expected from good material, so that there was sufficient margin left, provided that the material was really good. The test applied rather to the manufacture—to the weld, which was the weakest part—than to the material itself, and was thus efficient when good material was used; but still manufacturers could contrive to make an article which would just pass the test and nothing more, by employing inferior iron. Still he maintained that, although this might be the case, experience under the Act had shown that upon the whole we now got better cables than before the Act was passed; for, before that test was enjoined, seven-eighths of the ordinary chains would not stand the test at all by 15 to 20 or 25 per cent. He perfectly agreed, however, with the suggestion of Mr. Betterley, as to the taking out two or three links at the choice of the inspector and subjecting them to an additional test, which if they did not stand, the cable should be rejected. Some test should be used quite beyond that which related to the manufacture. No chain should be allowed to be used which would not stand at any part selected from 25 to 50 per cent. additional test. An allusion was made in the paper to the striking difference in the testing of boilers. If boilers were made as chain cables were, merely to be equal to the proof test, there would be no security for the quality of the material, and the test would be very imperfect, and therefore he believed the conditions imposed were that the plates themselves should stand a certain pressure to the square inch beyond that to which the whole boiler itself was subjected. Why could not the same principle be adopted with chain cables? A person who understood the manufacture of iron would, without testing a link at all, by simply breaking it to pieces under a hammer, know from the nature of the fracture, whether it was made of common, inferior, or good iron. That would be a good way to test the material used. The next question was that of general examination, and this could not be too perfectly performed. The Act of Mr. Laird, however well intentioned, was nevertheless defective; tending in a great degree to produce the result given in the letters which had been read. Still he was of opinion that there should be a compulsory test, because if it were left to the manufacturer there would be little or no test at all. Even now thousands of cables had gone out with certificates that never were near a testing machine at all. Then the next question was, was it sound policy for the government to provide a proper test? He most distinctly considered that it was. It had been left to private parties, and they had altogether failed in providing what was required. Lloyd's Committee, for which he had the honour for some years to be engineer, took great pains, before the passing of this Act, to establish public tests; and at first, before the manufacturer contrived to reduce the quality of the material, there was a great improvement in the chains produced; but, after a time, it was found that there were no means by which the quality of iron could be properly tested. He thought the Act could be so amended as to secure that protection which the public had a right to demand. In the proof at the dockyards, the quality of the material was examined beforehand, and the want of this additional precaution was the worst defect in the arrangement under Mr. Laird's Act. He had formed these opinions from long experience in this matter, and he hoped that some suggestions would be made and adopted, which would secure the desired object.

Mr. G. B. Galloway said he perfectly coincided with the views of the preceding speaker. It seemed a great anomaly that an inspector was appointed only to test the machine. He quite agreed that this was an underwriter's question, but it was a national question also. He did not think it would be sufficient to take out two or three links in order to test the quality of the cable, because the blacking and swaging covered up little defects in the welding which might pass unnoticed if the whole chain were not tested. He was of opinion that the importance of the question demanded a compulsory test, that a proper test could be devised, and that there never would be a proper test, except under Government inspection.

Mr. Beasley (of Liverpool) said although he thought the present Act did not now work satisfactorily, he was yet of opinion that it was quite capable of amendment. Several of the previous speakers had suggested the remedies, and he believed the noble lord who opened the discussion was right in saying that a great deal of the present breaking of cables resulted from the overstraining to which they had been subjected. Within the last twelve months he had had the cables of a new ship tested at the Birkenhead works, where there was admitted to be the best testing machine in the country. The ship he alluded to sailed in May last for Calcutta. She first of all parted one chain in Calcutta, and then she came back and anchored in the Downs, and there she parted the second. He had a piece of the broken link in his hand, and, as Mr. Gladstone had said that he could tell by looking at the fracture what was the quality of the iron, perhaps he would kindly say. The explanation of the cable-manufacturer was, that as shipowners, when they had a contract, sent round for the lowest tenders, the manufacturers went in for the lowest quality of iron that would bear the strain. He, in his simplicity, had always thought that when he had a cable which had passed the Admiralty test it would be capable of bearing any strain which was likely to come upon it. The present Act seemed, therefore, a mere delusion, especially as it now appeared that the Government did not themselves certify to the cables, but only to the machine, which he believed was contray to the impression of most underwriters. Here were two cables which had gone through the very best machine, and they both parted the very first voyage.

Mr. T. M. Gladstone asked whether the cable broke in the iron or in the weld.

Mr. Beasley said it had gone both in the iron and in the weld. Mr. Beasley then read a letter which he had received from the Inspector at the Birkenhead works, which, after describing the way in which the writer identified the cables, stated that one of the cables broke four times during the test, and had eleven other defective links, and the other one broke once, and had one other defective link; both were repaired on the premises, and were then re-tested. The following were the strains at which the links parted, which went to show that what had been stated, as to manufacturers calculating to a nicety, was correct:—The first link broke at 58 tons 15 cwt. in the iron (the admiralty-test being 59, so that it came within 5 cwt. of it); the next broke at 58 tons 14 cwt. in the iron; the next at 57 tons 15 cwt. in the iron; the next at 58 tons 5 cwt. in the weld; so that only one of the four faults was in the weld. The second cable broke at the exact strain of 59 tons. He thought the Act required a great deal of amendment, but he still was of opinion that compulsory testing should be continued.

Mr. T. M. Gladstone said the broken link which had been handed to him had been about half welded. It was perfectly clear that iron of that quality, if thoroughly welded, would have left a considerable margin of strength above the test. There were two conditions of

a defective weld. A link might be half welded, or it might be over-heated, and the quality of the iron thus destroyed at a particular part, although the general character of the material might be good. The only guard they could have against these evils was an examination by an independent person. There should be a full examination of the chain, and and also of the material before it was used. Those were the only securities they could have, for it was impossible, under any law, to obtain positive certainty in this matter, in the same way as they could arrive at the absolute purity of gold or silver.

Mr. Jones asked if it were ever noticed that a change in the form of the cable resulted from the testing of it, and if this were not followed by a diminution of strength.

Mr. Betterley said his experience showed that if a chain were tested beyond a certain extent, if the iron were good it was drawn out, and it became smaller than it was before. If it were struck with a hammer while under this strain, it would go to pieces.

Mr. Jones asked if it were possible then to subject a chain to a proper test without disturbing its form.

Mr. Betterley did not think it was possible to apply a test of any value without so doing. They might try it to a certain extent in order to try the workmanship, but the moment you began to try the character of the iron, that moment you began injuring it. He was therefore an advocate for a moderate test to try the workmanship, with liberty to take out two or three links at any part in order to try the quality.

Mr. Jones doubted whether there would not even then be a risk of some of the links being made of inferior material. He knew this was the case in gold chains; it was not safe to assay only one or two links.

The Chairman said his own opinion on that subject, both as a shipbuilder and shipowner, was decidedly opposed to the compulsory testing of anchors and cables. Firstly, on the principle that you could not make people moral by Act of Parliament, and, secondly, because he did not see why anchors and chains were to be the sole portion of a ship's outfit which was to be tested. They were important articles, no doubt, and occasionally the safety of a ship and of everybody on board depended on their strength, but why were they to be tested and not the rigging, masts, yards, and sails, on which that safety much more often depended. Whenever a ship was in deep water, and exposed to the full fury of the winds and waves, perhaps in a hurricane, her safety depended on her inherent qualities as a good ship, on the strength of her masts and rigging, and, more especially, on the strength of the main post of the rudder. He thought it was very unwise to legislate on one portion of a ship's outfit and not on the rest. His own experience of anchors and chains was that there was not the least difficulty in getting sound and good ones by any shipowner who would pay a good price. If they went to the very lowest market and paid 10s. to 10s. 6d. per cwt., they could not expect the same article as if they had paid 12s. When a man's name became known as an owner who provided his ships properly, the underwriters would have confidence in him, and would often be willing to underwrite everything on board at five per cent. less than they would in other cases, and in consequence he would perhaps be able to charge 2s. 6d. a ton larger freight. One practical result of the introduction of the Admiralty test was this:—They used to have what were known as Admiralty chains and merchant chains, and the merchant chains were required by the Lloyds Society of Underwriters to stand a certain test which was much lower than what was known as the Admiralty test. If shipowners were willing to have their chains made of a superior quality, so as to stand the Admiralty test, they were allowed to use smaller chains than if they only stood the merchant test. The practical working of the present Act was that smaller chains were used, so that although they might be of superior quality, they would not stand a greater strain than they used to do when they were larger but of slightly inferior quality. In his own mind he was convinced that the piecemeal legislation, which referred to only one portion of the ship's outfit, was objectionable, whilst it left everything else to the discretion of the owner. He begged to move a cordial vote of thanks to Mr. Galloway for the important paper he had read.

Mr. Galloway begged to thank the meeting for the patience with which they had listened to his paper, and also those gentlemen who had been kind enough to offer the remarks which he had been very much pleased to listen to. It seemed to be the general opinion that the law required amendment, and the only question was what the amendment should be. That must be very well and carefully considered, and he hoped that with the assistance of shipowners and others interested, a proper decision would be arrived at.

PARIS UNIVERSAL EXHIBITION.

Great advances have been made since the opening day, and those who desire to study the whole exhibition cannot do better than commence at once, before the public begins to throng the galleries; but this period will not be a long one, for now that the admission is only one franc, the stream will soon become large and constant.

The picture and sculpture galleries are more nearly complete than any other portion; the works were all hung, and the floor covered on the opening day, and on the day following the labels and numbers were being placed on the frames. In the French and other sections the walls are all, with very few exceptions, covered, and the same process of labelling is now going on there. The collection is an extremely fine one, especially as regards France, Russia, Germany, and England; the special galleries of Belgium and Holland in the park were not opened two days ago. The total number of works of art is very large, perhaps five thousand in all, without including the contents of the retrospective portion.

As regards the latter department, the French and Russian sections are the most forward; in the former there is a small but curious collection of ancient arms, bronzes, iron work, carvings in ivory and wood, all in perfect order. In the French section the cases are all ready, and are being rapidly filled; the show of enamels, carvings, faïence, iron work, and furniture is highly interesting, and promises to be very fine.

The English section of this gallery has been delayed by the fitting of a double-iron door, to prevent all chance of accident by fire; but, from what we have already seen of the promptitude exhibited by the commission, our retrospective gallery will very soon be complete.

With rare exceptions, the weather during the past week has been fine, and the effect on the park and garden is astonishing; the paths are now in fair order, the shrubs are budding forth, and the Paris gardener, from his immense stores, can fill the flower-beds at any moment as soon as the cold winds warrant his doing so. When the trees and shrubs are covered with foliage, the objection, somewhat captiously made, to the heterogeneous appearance of the park, will be almost entirely removed. But without any qualification or alteration, the park presents a mass of most interesting novelties, teeming with instruction for those who are inclined to study.

There is in the park a model crèche, where infants may be left by mothers visiting the exhibition; those who have the welfare of the working classes at heart, and especially those who reside in manufacturing districts, will do well to examine this simple but useful philanthropic establishment.

Men of business will be glad to know that the post and telegraph offices in the park are now in full operation; the regulations of the former are the same as at the prin-

cipal district offices in the city; that is to say, letters can be posted till a quarter to six, or with additional stamps of 20 cents, or 40 cents, till six, or a quarter past six. As regards telegrams, notice is given that the country and class, or section, must be added to the name of the exhibitor, or his agent, to insure delivery.

The special railway laid down for the purposes of the Exhibition is opened to the public, and promises to answer its purpose admirably. As already stated, it connects the Exhibition with the circular line around Paris, as well as with the terminus of the Western Railway, which is situated in the English quarter, not far from the church of the Madeleine. The trains at present run to and from the latter point every hour, and the journey occupies half an hour. The carriages are all of the second class, and the fare 50c. for the whole distance.

The Corps Legislatif has adopted the proposed law for the security of inventions and improvements; all those who exhibit anything which they desire to protect, whether mechanical or artistic, must comply with the regulations and forms of the patent or registration office in Paris within the current month, but no fees are charged by the Government.

The International Juries have commenced their labours, and, considering the time allowed, and the great extent of the collection, exhibitors should take care that all necessary facilities and information should be afforded to the juries, whose time is exceedingly precious; the British Commission has appointed a delegate in each class, to act as intermediate between itself and the juries, and thus protect the interests of British exhibitors as far as possible, but it depends upon the exhibitor to furnish the necessary information, and to see that his name, number, &c., are properly given. It may be well to mention that the delegate has nothing whatever to do with the appreciation of the objects; this rests entirely with the juries.

M. Walowski, the learned professor, member of the Institute of France, drew the attention of the students of the Conservatoire des Arts et Metiers, to the Exhibition, the other day, by a lecture on the History of Industrial Exhibitions. M. Levasseur, professor of history at the Lycée Napoléon, has also delivered a lecture on the same subject at the Sorbonne.

POSITION OF INVENTORS AT THE PARIS EXHIBITION.

M. de Fontainemoreau writes as follows:—

In accordance with the intention of the French Government, as intimated by M. de Forçade, Minister of Agriculture, Commerce, and Public Works in France, in his letter to my Paris correspondent, of which a translation was recently inserted in the *Journal* (p. 251), a bill was passed into law, on the 27th March, granting a "Certificat Descriptif," or provisional protection to exhibitors, non-patented in France, upon complying with the requirements enacted by such law, of which I beg to submit a translation for the information of your readers:—

Law of the 27th March, 1867, *Protecting until the 1st April*, 1868, *Industrial Inventions and Manufacturing Designs admitted to the Universal Exhibition of* 1867.

Clause 1.—Any French or foreign subject being the author of a discovery or invention susceptible of being patented under the law of the 5th July, 1844, or of a manufacturing design, which may be registered pursuant to the law of the 18th March, 1806, or his representatives may, if admitted to the Universal Exhibition, obtain from the Imperial Commission of the Exhibition a certificate, descriptive of the article deposited. The application for this certificate must be made within one month, at latest, from the opening of the Exhibition.

Clause 2.—This certificate secures to the person who obtains it the same rights as those conferred by a Patent of Invention, dating from the day of admission by the French or foreign authority appointed to that department, until the 1st April, 1868, even should that admission be anterior to the promulgation of the present law, and without prejudice to the patent which the exhibitor may take, or of the registration he may effect before the expiration of that term.

Clause 3.—The application for the certificate must be accompanied by a correct description of the article to be protected, and, if required, by a plan or drawing. These applications, together with the decisions taken by the Imperial Commission, shall be entered in a special register, which shall be ultimately lodged at the Ministry of Agriculture, Commerce, and Public Works. The issue of this certificate shall be gratuitous.

NEW FORM OF PORTFOLIO STAND.

The handling of large portfolios and books is often a matter of some difficulty. A novel form of portfolio stand has been contrived by Mr. F. H. McLauchlan, and is manufactured by Messrs. D. J. McLauchlan and Son, of Castle-court, Berners-street. It is so arranged that when closed it occupies less space than the usual kind of portfolio stand, and in opening the legs expand, giving greater stability. As the weight of the portfolio is partly balanced, the motion is very easy, and it will remain at any angle, or may be extended flat, in which position it can be fixed and used as a table. In one form the flaps are made solid for this purpose, and in another they enclose the contents as in a box. Various modifications enable it to be used for special purposes—thus, when intended as a stand for a large ledger, or similar book, it is made to open with the top inclined conveniently for writing.

Fine Arts.

Memorial to Thomas Stothard.—It is proposed that a bust be executed by Mr. Weekes of the late Thomas Stothard, and placed in the National Gallery, by the side of similar memorials to deceased British artists. It is said that ample materials exist for an authentic likeness in the pictures by Harlowe and Green, the bust by Baily, and the cast by Chantrey. Stothard's "graceful and classical designs," in illustration of standard authors, it has been thought by numerous admirers, entitle the artist to the memorial now proposed. Several subscriptions have been already received. Mr. William Smith, of 20, Upper Southwick-street, Cambridge-square, acts as hon. treasurer and secretary,

Colonies.

Local Exhibition at British Guiana.—A local exhibition of colonial products was held here early in the year, under the auspices of the Royal Agricultural and Commercial Society. It was formally opened by his Excellency the Lieutenant-Governor, who was welcomed by the president of the Royal Agricultural and Commercial Society, the president elect, the mayor of Georgetown, and several of the directors. The president read an address to the following effect:—After thanking his excellency for having consented to preside, reference was made to the exhibitions held in January, 1855, and August, 1861, and it was stated that the present exhibition, like the former, was not merely of a local character, for the purpose of promoting among all classes of the community competition in the development of the industrial resources of the colony, but was subsidiary to the representation of British Guiana at the Paris Exhibition of 1867. In addition to the advantages of the undertaking in its industrial, commercial, and scientific points of view, the meeting, for a common purpose, fo a

large number of persons representing those of the different classes who were anxious to promote the interests of the country, must foster kindly feelings, and a sense of the benefits to be mutually derived from co-operation. Brief mention may be made of some of the most interest-objects in the rooms. Samples of vacuum pan and muscovado sugars of various qualities,—some of the former too white and good to admit of its being exported—and of white and coloured rum and molasses were exhibited and admired. There were some excellent specimens of different kinds of cotton, and an important display of starches, fibres, oils, medicinal plants and other valuable objects. There were cases of rare and curious birds. The collection of insects by Dr. Whitlock was excellent and well-arranged, the estimated value being £100. There were some fine fruits, flowers, and vegetables exhibited, and many and various articles remarkable for beauty, rarity or curious workmanship. A collection by Mr. Firth, sub-agent of immigration, of works having reference to the colony, its affairs, natural history or products, excited much interest. There were no less than 194 volumes and about 240 pamphlets, some of them of great antiquity. An extra prize of 50 dols. was awarded to Mr. Firth. The exhibition was kept open for six days. On the first day the charge for admission was half-a-crown, but on the other days only a shilling, and a sum somewhat exceeding £100 was realised. There is a disposition to have another local exhibition at the close of the present year. The feeling is gaining ground that to have one annually instead of quinquennially would do much good. Great praise is due to Dr. Whitlock, the honorary secretary to the Committee of Correspondence, for the skill he displayed, and the interest which he took in everything connected with the exhibition.

Publications Issued.

The Laboratory; a Weekly Record of Scientific Research. (*Firth*, Cannon-street).—The first number of this new magazine appeared on the 6th April. The editor says, "in putting forth this, the first number of *The Laboratory*, we are actuated by the conviction that the want this journal is intended to supply has hitherto been inadequately met. We believe that the large and important class which includes the cultivators and students of experimental science has not, up to the present moment, been presented with a journal fully reflecting that which is being accomplished in the public and private laboratories of the United Kingdom. When a train of subtle scientific thought and labour has culminated in a great result, the ordinary journals take note of the fact; but the minor and tentative labours that contribute to rear the great edifice are left unnoticed till the work is completed. It is our intention to record these early efforts—these original investigations—whilst they are being made. We shall not wait until the theory be perfected—until the history be completed; we shall give the elements that are being used in building up the theory—the materials that, as we write, are growing into the history. We submit that at the present juncture, when new theories and new systems of notation are absorbing so much attention, the appearance of a journal which shall, in the respects already mentioned, differ from its contemporaaies and rivals, must be warmly welcomed by the class to which it addresses itself."

A Treatise on Coal and Coal-mining. By Warrington Smyth, F.R.S., Chief Inspector of the Mines of the Crown and of the Duchy of Cornwall. (*Virtue, Brothers.*)—Mr. Smyth explains all the operations of coal-mining, together with the lighting and ventilation of the pits, and the securing of them against accidents. The work contains information on the extent of the coalfields throughout the world, including even those of Australia, China, and India. The author maintains that, if things continue as they are going on at present, England will soon cease to have any advantage over some parts of the Continent in the price of coal, and Europe itself will be exhausted of its combustible minerals. He is of opinion that the present ratio of yearly increase in the exportation of coals will not be maintained, and that much may be done at home to stay our wasteful use of them.

Notes.

Gas Lighting.—At the last monthly meeting of the Glasgow Architectural Society, Mr. W. Johnston, of that city, read a paper "On Gas Lighting," in which he stated that the people of London tolerate the most clumsy and ill-fitted gas appliances in their shops and houses—gas so foul and coarse, street lamps of such imperfect construction, as would not be tolerated in any third-rate town in Scotland. He argued, from calculations which he laid before the meeting, and from the experience of Glasgow, that the London gas companies ought to be able to sell cannel coal gas at 5s. 5d. per 1,000 cubic feet, of a quality 2½ times better in illuminating power than that which they now supply at 4s. and 4s. 6d. At the conclusion of his paper he gave the following rules for consuming gas:—For coarse gas, use No. 5 fish-tail burners at moderate pressure; for cannel gas, Nos. 2 and 3 fish-tail burners; renew the burners frequently; check the pressure at the meter when it gets too strong; distribute new lights in all buildings instead of concentrating them in one spot; bring the lights as near as convenient to the place to be lighted; use in fitting, good full-sized gas pipes; select lamps which afford the least obstructions to the light; and above all, avoid trashy low-priced appliances for gas lighting. Dr. Frankland, in his lecture at the Royal Institution, on the 23rd of March, remarked on the bad quality of the gas supplied to London. He thought the public were not fairly treated by the gas companies. Sixteen years ago he had examined the London gas, and now he found it to be considerably worse than it then was. Had there been no improvements in this direction since that time? Undoubtedly there had, and any invention which decreased the cost of manufacture was eagerly seized, but those relating to improving the quality of the gas were entirely ignored. To obtain the same amount of light in London as is obtained in Edinburgh it was necessary to burn twice as much gas, to put up with twice as much heat caused by its combustion, and to inhale ten times as much sulphurous acid. No gas ought to be considered good enough for use which did not give a light equal to twenty standard candles when burning five cubic feet per hour.

Correspondence.

Cottage Building.—Sir,—Are you aware that at a meeting of the Society in May, 1850, the attention of the meeting was called to a model of a three-roomed labourer's cottage, erected by Mr. W. N. Clay, at Harlow, in Essex, at a cost, it was stated, of £10 only? The walls were described as formed of clay lumps, dried in the sun, having an admixture of straw in their composition; the roof was thatched, and the floor of concrete. Analogous modes of building, not only for cottages, but for houses of large size, in Cornwall, Hampshire, and the west of England, were mentioned by some members at the meeting, as well as the "Pisé work" used in Italy for churches and large buildings.—I am, &c., An Old Member.

Concrete Walls.—Sir,—In the short communication which appeared in the last *Journal*, respecting the cost of concrete dwellings, the printer has made an error, and placed "12 × 12 × 7," instead of 12 × 12 × 9, which is a very serious difference. I shall feel greatly

obliged if you would cause it to be rectified. I wish to say a few words respecting Nicol's patent slabs, the principal advantages of which are—economy of construction and of space; the partitions in no case need be more than three inches thick, but the generality of them only 1½ inch thick. They also have the advantage of not absorbing water or damp, and of giving the easily-washable surface declared to be so desirable for hospitals. This may be of a light and cheerful appearance, so that no papering is required. The walling is, from its substance, highly non-conducting and warm, and the building can be inhabited without danger of fevers, &c., to which newly-built brick houses are liable if inhabited as soon as completed.—I am, &c., Samuel Sharp.

Flax and Flax Machinery.—Sir,—I am glad to find, by the report of the meeting of the 27th inst., that attention is again directed towards the cultivation and management of flax in England. The quantity and quality of flax fibre received from India has not been so satisfactory as was at one time anticipated, and it is now generally thought an effort should be made to extend the production in the British Isles. At present the prices paid for good flax fibre are very high, and should be amply remunerative to the farmer, under ordinary circumstances. The cost of scutching (or cleaning) has remained almost the same for years back, and this item of expense is not now so heavy in proportion to the value of the fibre as it was when I published my book on flax some years ago.* After many experiments and trials the old scutch mill is still preferred in this country, combined, however, with improved fluted metal rollers, for breaking the flax previous to the scutching operation. The old mill is now perhaps cheap enough, and the chief objection to it appears to be the unhealthy nature of the occupation, owing to the immense quantity of fine dust inhaled by the workers. Something might, no doubt, be done to correct this defect, by improved ventilation, &c. I fear there is little chance of a machine being invented that will not require skilled labour; the scutching process requires great judgment, and that cannot be had with untrained hands. The breaking machine alluded to on Wednesday evening is something like an American invention, introduced a few years ago into this country, with very moderate success. The scutching mill of Messrs. Rowan, described in my book (page 73), was not very unlike that recommended by Mr. Young; but it has not been generally adopted, and the old mill still carries off the palm in Ulster. If Mr. Young succeeds in perfecting an improved breaker and scutcher, he will confer a lasting benefit on the flax-growing community, and I wish him every success, though I feel the difficulties before him are, to say the least, serious. In the discussion at the meeting it was remarked by a speaker that the flax seed should be grown for crushing into cake. Now, experience here is in favour of using the bolls for feeding, and uncrushed. In fact, the flax is pulled before the seed is ripe. The seed being thus not mature, would, I fear, hardly pay, under these circumstances, for the expense of crushing; indeed most Irish growers still think the seed of so little importance, that in the majority of cases, I believe, it is never taken off at all, and completely lost in the watering process; a proceeding often defended on the plea that the fibre is improved by this mode of treatment, and will bring a higher price; the water is supposed to be made softer, and thus to act better in the retting process, owing to the presence of the oily seed; while it is further argued that taking off the bolls (or ripling) always, more or less, injures the ends of the fibre. I believe there is some truth in the latter assertion, but still ordinary care will prevent such an occurrence. I have every reason to think that the former idea, as to the water, is quite erroneous. There is, however, no doubt that ragweeds spread on the top of the flax in the steeping-pond have a good effect; and several farmers—who have lately tried the use of this common Irish weed in this way—have thanked me for the suggestion, and stated they observed a marked advantage. Another fact I may mention as worthy of notice is, that a large flax crop extracts from the soil very much the same ingredients as the turnip crop; consequently, if grown closely together in a rotation, these crops become exhaustive, and the produce limited. Between turnips and flax, in rotation, there should be four or five years, and between flax and flax again, six or seven. Unless this is attended to, and the details of cultivation carefully looked after, flax will likely disappoint the grower; but, with a moderate amount of intelligence and skill, a profit, varying from £3 to £20 per acre, can be realised.—I am, &c., William Charley, J.P.

Seymour Hill, near Belfast, April 3, 1867.

* "Flax and its Products." Bell and Daldy, 1862.

MEETINGS FOR THE ENSUING WEEK.

Mon..... London Inst., 7. Prof. Westwood, "On Entomology."
Society of Engineers, 7½. Discussion on Mr. Henry Davey's paper, "On Pumping Engines for Town Water Supply."
Medical, 8.
Victoria Inst., 8.

Tues ...Civil Engineers, 8. Col. Sir Wm. Denison, "The Suez Canal."
Statistical, 8. Dr. Guy, "On the Mortality of London Hospitals, and, incidentally, on the Deaths in the Prisons and other Public Institutions of the Metropolis."
Pathological, 8.
Anthropological, 8.
R. Horticultural, 3.

Wed ...Geological, 8. 1. Mr. Robert Etheridge, "On the Physical Structure of North Devon, and on the Palæontological Value of the Devonian Fossils." 2. Mr. W. Whitaker, "On Subaërial Denudation; and on the Cliffs and Escarpments of the Chalk and Tertiaries."

Thur ...Linnæan, 8. Dr. Cobbold, "On the Prevalence of Entozoa in the Dog; with remarks on their Relation to Public Health."
Zoological, 4.
Chemical, 8.

Fri .....Philological, 8.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 22nd March, 1867.

45. Bills—Metropolis Gas.
81. „ Houses of Parliament.
82. „ National Gallery Enlargement.
124. Coolie Trade—Papers.
130. Army (Ration Stoppages)—Letter.
145. Poor Relief, &c. (Metropolis)—Return.

Delivered on 23rd March, 1867.

97. Board of Audit—Correspondence.
110. Civil Services—Treasury Minute.
111. Exchequer and Audit Departments Act (1866)—Return.
112. Exchequer Bills and Bonds—Treasury Minute.
133. Bullion—Return.
136. Parliamentary Boroughs—Returns.
141. Foreign Seamen and Apprentices—Returns.
149. Savings Banks (England and Wales)—Return.
M. Lamirande—Correspondence.
M. Lamirande—Correspondence with the Governor-General.
Turkey—Despatch from Lord Lyons respecting Reforms and Treatment of Christians.
Public Petitions—Eleventh Report.

Delivered on 25th March, 1867.

85. Bills—Policies of Insurance.
136. Parliamentary Boroughs (corrected pages).
143. Farmhouses—Return.
147. Private Bill Committees—Return.

Delivered on 26th March, 1867.

84. Bill—Ecclesiastical Titles Act Repeal.
132. Registrars (Ireland)—Return.
Church Estates Commission—Sixteenth Report of Commissioners.
Ecclesiastical Commission—Nineteenth Report of Commissioners.
The "Tornado"—Correspondence (Part III.).

Delivered on 27th March, 1867.

122. Queen Anne's Bounty—Returns.
138. Offices of Profit—Return.
The "Tornado"—Correspondence (Part IV.).
Public Petitions—Twelfth Report.

Delivered on 28th March, 1867.

86. Bills—Bridges (Ireland).
88. ,, Metropolitan Water Supply.
90. ,, Promissory Notes (Ireland).
93. ,, Trades' Unions (Lords Amendments).
123. Harwich Harbour—Abstract of Accounts.
144. Agricultural Holdings (Ireland)—Returns.
British North America (Canada Railway Loan)—Correspondence.

Patents.

From Commissioners of Patents' Journal, April 5th.

Grants of Provisional Protection.

Anchors, tackle for weighing, &c.—723—F. R. A. Glover.
Bale fastener—751—A. V. Newton.
Beer-engines—724—M. Henry.
Belt fastener—760—W. R. Harris.
Boilers and safety-valves—779—W. H. Parsons.
Boxes—740—W. E. Newton.
Brakes—821—L. Latter.
Bread, &c., preparation of—766—J. Hickisson.
Brushes, rotating—767—S. Holness.
Candles, securing—726—W. Wootton.
Candlesticks—735—S. Clarke.
Capsules—3245—A. S. Stocker.
Carriage heads, apparatus for raising—784—E. Harvie.
Cartridges—805—M. A. F. Mennons.
Cartridges—820—W. Clark.
Cast-iron, annealing—763—J. Kennedy.
Cereals, decorticating—832—W. W. Gibson.
Chloride of lime, manufacture of—728—B. Platt.
Chronometers, &c.—824—W. E. Newton.
Coal, &c., boring and excavating—733—W. Read.
Coffee percolators—828—W. R. Lake.
Collars (paper), &c.—829—C. Kaufmann.
Cooking apparatus—746—W. H. Graveley and J. Ewing.
Coolers for liquids—817—H. Clifton.
Core bars and studs—813—D. Y. Stewart.
Covers for jars, &c.—826—W. D. Player.
Cramping and lifting apparatus—742—J. P. Bagaranwath.
Cranes—844—R. Duncan.
Digging machines—859—G. Davies.
Disinfecting, &c., apparatus—729—J. C. Morrell.
Door-knobs—804—T. K. Mace.
Dyeing, &c.—743—J. Keymer and W. Whitehead.
Electro-magnetic, &c., machines—842—H. Wilde.
Engines, heated air—776—F. H. Wenham.
Engines, rotary—755—W. R. Lake.
Fabrics, &c., apparatus for exhibiting—811—G. Chambers.
Fabrics, textile—815—J. Booth.
Fences, &c.—831—P. Dickenson.
Fibrous materials, printing skeins of—795—J. H. Johnson.
Fire-arms, breech-loading—731—M. F. Halliday.
Fire-arms, breech-loading—761—M. A. F. Mennons.
Fire-arms, breech-loading—768—T. Shedden.
Fire-arms, breech-loading—769—A. V. Newton.
Furnaces—830—G. Cross and R. Evans.
Furnaces, &c.—840—S. Sedgwick.
Furnaces, supplying heated air to—741—W. Hamer and J. Davies.
Gas, artificial material for producing—721—J. Hamilton.
Gas retorts, removing carbon from—790—J. Hislop.
Glass, globular, &c.—835—E. S. Tucker.
Gun locks—781—J. Smith.
Guns, breech-loading drop—800—J. Portlock.
Hats, pouncing—758—E. Nougaret.
Knife-grinders—765—R. Canham.
Knives, &c.—843—W. H. Rayner and J. T. Heath.
Lamp extinguisher—855—G. T. Bousfield.
Liquids, measuring—720—T. and T. F. Walker.
Looms—812—J. Leeming.
Machinery, ascertaining speed of—736—J. B. Dancer.
Machinery for raising, &c., heavy bodies—822—J. A. Limbert.
Machinery, ironing, pressing, &c.—793—J. M. Clements.
Metal tubes, coating—865—A. Parkes.
Metals, coating—810—G. Bischof.
Oils, heating and illuminating—391—J. Y. Simpson.
Photographic pictures—825—H. W. Hart.
Photographic pictures, &c.—849—E. Edwards.
Pianofortes—778—H. Simms.
Pictures, &c., on glass, &c.—732—E. Lee.
Pyrites, &c., mode of treating—789—C. Allhusen.
Railway tickets, printing—839—G. Adams and W. T. Whiteman.
Refrigerators, &c.—818—H. Clifton.
Reins—853—J. G. Tongue.
Retorts and cylinders, apparatus for driving—802—P. T. Goodwin.
Retorts, charcoal—738—P. T. Goodwin.
Rollers—725—G. Rumbelow and H. Kendall.
Safety apparatus—754—J. P. Harper.
Safety-valves—785—C. F. Cooke.
Screw-propellers—739—J. Ferguson.
Sea-water, distilling—3165—S. J. Browning.
Sewage, apparatus for purifying—788—A. H. Hart and W. Parry.
Sewing machines—792—A. V. Newton.
Sewing machines—806—S. M. Tyler.
Ships, &c., measuring speed—663—M. Henry.
Ships, iron, protection from corrosion, &c.—745—J. Westwood and R. Baillie.
Ships' pumps, working—727—J. Griffiths.
Signalling apparatus, &c.—730—W. Esplen and J. J. B. Bland.
Silver, extracting—737—W. G. Blagden.
Smoke, prevention of—762—J. Grundy.
Soap, preparing—752—G. Smith.
Spades, &c., handles of—803—J. W. Yates.
Spinning flax, &c.—837—J. Lawson.
Spinning machinery—750—W. E. Newton.
Stay busks, fastening and unfastening—701—L. C. Sodeman.
Stays—857—T. Pebardy.
Steam boilers, preventing incrustation in—774—J. Smith.
Steam-engines and boilers—771—E. E. Allen.
Steam-engines, marine—747—E. P. Plenty.
Steam fire-engines and boilers—772—J. Shand.
Steam road rollers—796—T. Aveling.
Steering apparatus—764—G. Hutson.
Telegraphs, printing—816—J. H. Simpson.
Transparent pictures—705—T. Hatton.
Travelling trunk, bath, and cradle combined—773—W. H. Bailey.
Turnips, &c, preparing—734—H. Smith.
Umbrellas, &c.—845—J. H. Soller and E. Barber.
Urinals, &c.—823—W. Lorberg.
Valves, &c.—836—J. Whitley.
Valves, slide—759—J. Milner.
Varnish for healds of looms—744—J. R. Parkinson.
Vegetable fibres, disaggregation of—799—W. Clark.
Ventilating and steam-heating apparatus—827—G. Haseltine.
Ventilating and warming buildings—791—M. Semple.
Ventilating public buildings—722—W. E. Newton.
Watches, apparatus for protecting—803—B. J. Smith.
Weaving—780—D. Ellis and M. Hillas.
Wood, &c., preservation of—814—G. E. Marchisio.
Wool, &c., combing—834—G. Little.
Wool, &c., treatment of—861—J. H. Johnson.
Wool, dyeing—748—J. H. Johnson.

Inventions with Complete Specifications Filed.

Paper machinery—971—F. Curtis.
Railway brake—975—H. A. Bonneville.

Patents Sealed.

2578. W. Clark.
2582. J. H. Roberts.
2595. J. Greening.
2596. J. W. Baker.
2597. J. Monnin, C. Bosc, and C. A. Boissenot.
2598. H. Forbes.
2599. W. E. Gedge.
2601. M. Mirfield and J. Scott.
2603. J. Conlong.
2606. G. W. Shinner.
2607. T. Outram.
2609. C. J. Hill.
2620. J. Bullough.
2638. D. Evans.
2659. G. Lake.
2720. J. G. Tongue.
2958. A. V. Newton.
3058. A. V. Newton.
3214. J. Williamson.
10. J. Plews.
100. W. Clark.
160. F. C. Rein.

From Commissioners of Patents' Journal, April 9th.

Patents Sealed.

2619. M. Myers.
2625. E. B. Wilson.
2628. D. Crichton, W. Donbavand, and D. Crighton.
2635. H. Jones.
2645. E. Beanes.
2649. L. R. Bodmer.
2650. L. R. Bodmer.
2654. W. Rosseter.
2655. S. Collins.
2656. J. and J. G. Dale.
2660. J. Giles.
2670. W. H. P. Gore.
2686. C. A. Girard.
2737. G. Haseltine.
2739. W. R. Lake.
2741. J. Ogden.
2744. J. Watts.
2756. H. Phillips.
2773. J. Wagener & G. J. Firmin.
2831. W. S. Ashton & J. Johnson.
2894. W. Goodbrand and T. E. Holland.
3077. J. and W. Kitchen and S. Samuels.
3135. G. Howard.
3150. W. W. Pilcher.
3383. J. R. Cooper.
220. C. Wheatstone.
309. S. Plant and W. Tatton.
323. A. V. Newton.
357. M. J. Haines.
463. G. Haseltine.
465. W. R. Lake.

Patents on which the Stamp Duty of £50 has been Paid.

816. C. Sanderson.
839. T. Bourne.
776. E. Grether.
834. L. Cooke.
837. J. Smith.
861. W. T. C. Pratt.
896. J. Dodge.
850. J. Platt, E. Spencer, and J. Dodd.
875. C. Beard.
897. A. B. Brown.
925. F. A. Gatty.
865. J. F. Sharp.
863. J. H. Johnson.
1233. W. E. Newton.

Patents on which the Stamp Duty of £100 has been Paid.

887. H. Bridle.
891. T. Aveling.
886. J. Hamer.

Journal of the Society of Arts.

FRIDAY, APRIL 12, 1867.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'Clock :—

April 24.—"On the Construction of Iron Ships, and their Preservation by Zinc Sheathing." By S. J. Mackie, Esq., F.G.S.

Cantor Lectures.

Mr. Hullah's course, "On Music and Musical Instruments," will be extended by two additional lectures, as follows :—

Lecture VII.—Monday, April 29.

Musical Instruments (*continued*).—The Bow—The Key-board—The Violin—The Organ—The Clavichord.

Lecture VIII.—Monday, May 6.

Modern Instruments, Chamber and Orchestral.—The Pianoforte—Combination of Instruments—The Orchestra.

The lectures commence at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend.

Artizans' Visits to Paris.

The Council of the Society of Arts, feeling the importance of promoting the intelligent study of the Paris Exhibition and the manufacturing establishments in France by artisans of the United Kingdom, have appointed a Committee in furtherance of this object. The following gentlemen constitute the Committee :—

Rt. Hon. C. B. Adderley, M.P.
C. W. Aitken.
Edward Akroyd, M.P., *Vice-Pres.*
Sir W. G. Armstrong, C.B.
A. S. Ayrton, M.P.
S. A. Beaumont.
John Bell, *Memb. of Council.*
Professor Bentley, *Memb. of Council.*
Lord Berners, *Vice-Pres.*
Hon. and Rev. S. Best.
D. Roberton Blaine, *Memb. of Council.*
W. H. Bodkin (Assistant-Judge), *Vice-Pres.*
Sir J. P. Boileau, Bart., *Vice-Pres.*
R. K. Bowley.
Antonio Brady.
Rt. Hon. H. A. Bruce, M.P.
Decimus Burton.
C. Buxton, M.P.
The Earl of Caithness, *Vice-Pres.*
Lord Eustace Cecil, M.P.
R. L. Chance.
Harry Chester, *Vice-Pres.*
The Masters of the City Companies.
Henry Cole, C.B., *Vice-Pres.*
Robt. Coningsby.
Rt. Hon. W. Cowper, M.P.
Sir Francis Crossley, Bart., M.P.
J. Bailey Denton, *Memb. of Council.*
Lord de l'Isle and Dudley, *Vice-Pres.*
The Duke of Devonshire.
Charles Dickens.
James Easton, *Memb. of Council.*
C. W. Eborall.
Lord Ebury.
Lord Elcho, M.P.
William Fairbairn, F.R.S.
Professor Fawcett, M.P.
Peter Graham, *Memb. of Council.*
The Earl Granville, K.G., F.R.S., *Vice-Pres.*
The Earl Grosvenor.
Mr. Hansard.
G. W. Hastings.
Wm. Hawes, F.G.S., *Vice-Pres.*
J. Pope Hennessy.
Sir Rowland Hill, K.C.B.
Chandos Wren Hoskyns, *Vice-Pres.*
T. Hughes, M.P.
Blanchard Jerrold.
Rev. C. Kingsley.
Hon. A. F. Kinnaird, M.P.
Lord Henry G. Lennox, M.P., *Vice-Pres.*
The Bishop of London.
The Sheriffs of London and Middlesex.
Rt. Hon. Robt. Lowe, M.P.
Lord Lyttelton, *Vice-Pres.*
Archbishop Manning.
Henry Maudslay, *Memb. of Council.*
Rev. F. D. Maurice.
The Lord Mayor.
J. Stuart Mill, M.P.
Rev. Dr. Miller.
The Bishop of Oxford.
J. Slaney Pakington, *Memb. of Council.*
Right Hon. Sir John S. Pakington, Bart., M.P., *Vice-Pres.*
Alderman Sir B. S. Phillips.
Sir Thomas Phillips, Q.C., F.G.S., *Vice-Pres., Chairman of the Council.*
The Duke of Richmond.
Rev. W. Rogers.
The Marquis of Salisbury, K.G., *Vice-Pres.*
Titus Salt.
Sir Francis Sandford, *Vice-Pres.*
Colonel Scott, R.E., *Memb. of Council.*
The Earl of Shaftesbury.
Benjamin Shaw, *Memb. of Council.*
Sir J. P. Kay Shuttleworth, Bart., *Vice-Pres.*
S. Smiles.
Seymour Teulon, *Treasurer.*
Thomas Twining, *Vice-Pres.*
Alderman Waterlow, *Memb. of Council.*
E. W. Watkin, M.P.
G. Watts.
George F. Wilson, F.R.S., *Memb. of Council.*
Vice-Chancellor Sir Wm. Page Wood, F.R.S., *Vice-Pres.*

The Council, on the recommendation of the Committee, have passed the following minute :—

At the last and former International Exhibitions held in this country, arrangements were made by the French Government to facilitate the visits of skilled artizans, and interesting reports on the exhibitions were made by them to their government. Believing that such visits on the part of skilled workmen to these great international displays not only exercise a beneficial influence upon the men themselves, but also upon the progress of industry in the country to which they belong, the Council of the Society of Arts have resolved to raise a fund to be employed in aiding a limited number of English workmen to proceed to Paris for the purpose of studying the present French Exhibition.

To carry this object into effect, they have agreed on the following plan :—

1st. That a number of selected workmen (the number to depend on the amount of funds at the disposal of the Council) shall be assisted to proceed to and remain in Paris a sufficient time (say three weeks), for the purpose of making a careful study of the exhibition, and of such factories and workshops as they may desire to visit.

2nd. That every man so assisted shall, on his return, make a report to the Society of what he has observed during his stay, in reference to the special industry in which he is engaged, and that it be made a condition of the grant to each man that one-third of the amount be retained until his report shall be supplied to the Society.

3rd. The Council think it will be undesirable to fix the exact time for, or to prescribe the duration of, these visits, or to interfere with any of the arrangements the men may desire to make for their own accommodation; but, in order that they may take advantage of the facilities provided by the Commission organised by the French Government for the study of the exhibition, the men will be placed in communication with that Commission on their arrival in Paris.

4th. A considerable sum will be required satisfactorily to accomplish the important object undertaken by the Society, and, in order to raise these funds, the Council have determined to appeal to the members of the Society,

who must be interested in the successful results of this movement, in the belief that they will not hesitate to join in a subscription for the furtherance of the undertaking; and they propose at the same time to communicate with the various Chambers of Commerce, inviting their counsel and support. The Council have decided to commence the subscription by a vote of one hundred guineas from the funds of the Society.

The following report has been made by the Secretary:—

To the Council of the Society for the Encouragement of Arts, Manufactures, and Commerce.

Gentlemen,—In compliance with the directions of the Council, I proceeded to Paris for the purpose of ascertaining what arrangements were likely to be available with regard to the lodging and boarding of such artizans as might visit Paris under the auspices of the Society.

I soon found, from inquiries made in various quarters, that little information of any value, as to the probable cost of private lodgings generally, or as to what lodgings would probably be available, was likely to be obtained; indeed, any figures or statements under this head at that time were not likely to be of any use, or in any way to be a guide to the deliberations of the Committee.

The prices asked at that time were exceptionally high, but there was every reason to believe that a reaction would take place, and that, after the exhibition had been open a short time, these prices would diminish.

Mr. Cook, the well-known excursionist, I found was prepared to contract for the lodging and boarding of 50 artizans per week, supplying two substantial meat meals per diem, for 5s. per head per day. I subsequently placed myself in communication with M. Le Play, the General Commissioner of the Exhibition, who informed me that a Special Commission had been formed, under a ministerial decree, for effecting the very objects I was in search of, and he gave me a special letter of introduction to the Chairman of that Commission, Mons. Devinck, formerly President of the Tribunal of Commerce for the Department of the Seine, and I had two interviews with that gentleman. It appears that the object of this Commission is to raise, by subscription or otherwise, funds for facilitating the visits to the exhibition of foremen, workmen, or labourers connected with industrial and agricultural pursuits, and for enabling them to study the exhibition in all its aspects.

The Commission proposes to raise a fund (to which the Emperor and Empress have subscribed largely) in order to provide lodging and board at a cheap rate for artizans, to assist workpeople in their travelling to and from Paris, and to supply gratuitously medical aid in case of sickness. Mons. Devinck informed me that the Commission expected to have under their control five thousand beds. These are situated in different parts of Paris and the outskirts. They have had placed at their disposal large buildings and barracks, and some of a temporary character have been specially erected in the neighbourhood of the exhibition, which will be furnished suitably for the purpose, and beds will be arranged in the rooms, four and upwards in each room. In one of the buildings it is said that several hundred beds will be placed in one room.

Arrangements are made for breakfasts and dinners on a large scale and at a cheap rate, in a building erected for the purpose, with access to the Champ de Mars, where 1,000 persons can take refreshments at one time.

These arrangements, more especially those for aiding workmen gratuitously in their travelling expenses, were intended for French workmen, but at the same time all the organisation of the Commission is intended to be available for the workmen of other countries.

It is also intended that guides, speaking English and such other languages as may be necessary, shall be provided to conduct the men over such workshops as they may wish to visit. M. Devinck stated that on receiving notice a sufficient time beforehand, the Commission would be prepared to provide lodging for such men as might be sent over and recommended to their consideration by the Society of Arts, at a payment of one franc per night per head. Their breakfasts—a substantial meal of meat—and dinners would be obtainable in the building I have before named, at one franc per head for each meal.—I am, &c.,

P. Le Neve Foster, Secretary.

P.S.—Since writing the above, I have received the following tariff of prices at the restaurant referred to in my letter:—

Grand Restaurant Omnibus, Parc de l'Exposition (Avenue Lamotte-Piquet).

Prix des objets de consommation.

Pain	0fr.	10c.
Vin, le carafon	0	15
Bière, la chope	0	25
Bouillon	0	15
Potage	0	20
Bœuf	0	25
Légumes	0	20
Fromage	0	15
Café avec eau-de-vie	0	30
Roti *avec légumes*	0	40

On peut demander un seul des objets de consommation ci-dessus mentionnés.

Le consommateur, en apportant son pain, peut se procurer pour 0fr. 40c. l'*ordinaire* (bouillon et bœuf).

Members are invited to aid the Council in this undertaking by subscriptions, which should be forwarded to the Financial Officer at the Society's house.

The Council have received offers of co-operation from a Committee for promoting cheap excursions to the Exhibition, formed under the auspices of the "Working Men's Club and Institute Union," and of which Mr. A. H. Layard, M.P., is President, and Mr. Hodgson Pratt, Vice-President. A deputation from this Committee, consisting of Mr. Hodgson Pratt, Mr. W. Glazier, Mr. Paterson, and Mr. W. O. Pocklington, Secretary to the Committee, has had an interview with the Chairman of the Council and Mr. W. Hawes on the subject.

Subscriptions.

The Lady-day subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Food Committee.

The Sub-Committee on meat met on Wednesday, the 27th March. Present: Benjamin Shaw, Esq., in the chair. Messrs. Harry Chester, C. S. Read, M.P., J. Ware, and E. Wilson.

In reply to questions from the Chairman and the members of the committee,

Mr. A. Slater, who had kindly attended at the request of the Committee, said—I am a butcher, carrying on a large business in the west-end of London, and am well ac-

quainted with the meat trade; not only a large number of animals are slaughtered in my establishment, but I buy largely meat slaughtered in the country. Meat, in order to travel in good order, must have been killed some short time before it is packed. It must be what we call "set." The time required for this differs at different seasons of the year; it will soon get set in cold weather, but in warm weather I should certainly give it one night; we kill as late in the day as possible in summer time, in order to get rid of the animal heat and moisture during the night.

Mr. Chester—Do you use any artificial means for drying it?

Mr. Slater—No; we merely let it have air. If we want to use the meat quickly in summer time we should cut it up as soon as we could after it was killed; sometimes it happens that on a Saturday night poor people want their piece of meat for Sunday, and we kill a number of sheep in sultry weather always on Saturday night for poor people, because they have no convenience for keeping it. I have several places of business, one at Kensington, one in Jermyn-street, one in Pimlico, but I kill only at Kensington.

Mr. Chester—Did you find there was any considerable difficulty in carrying on your business since the regulations which have been imposed by the Government on the movement of cattle consequent on the cattle plague?

Mr. Slater—I did at first. The difficulty was, I could not get the dead meat up regularly. For instance, I had bought a lot of meat from one, and sent for it to come to town on Tuesday; another, to let it come on Wednesday, and another on Thursday; up came all sorts of excuses; they were very sorry they could not get it butchered; for two or three days I was without meat, the third day I got the whole lot up at once. I do not, however, say, kill everything in London; but I do not think a butcher's business can in summer time be carried on with any advantage to the public, unless we have our own slaughter-houses. The dead meat which I buy comes from all parts. Meat from Scotland comes in better condition than from any other part. We cannot, however, always rely on its coming in good condition. I do not know how long it is on the journey from Scotland, because in some instances it comes by the ordinary traffic, whilst in some instances they have special trains for it. I believe they have special arrangements on railways for the carriage of dead meat, but I think a salesman would give you better information about that. I believe, if it is not conveyed by a certain time from some places, that the railways are subject to a penalty, but that is only from some places; there are no special vans for meat; it is tumbled in any way.

Mr. Chester—Do you think the meat is injured owing to the manner of loading it?

Mr. Slater—Certainly; of course, in hot weather, if you put a lot of meat together it injures it, for where it rubs together you find a lather like soap, but when it is packed in canvas you do not notice that. If I killed at a very distant place instead of Kensington, I should like to have a carriage built on purpose, so that when I had killed the meat I could put it in that carriage, and hang it as close as I could pack it. I would send it to the railway at once, so that there should be no handling of the meat. I should not care to pack it in canvas if I had a carriage built on purpose, as I would hang it up warm as soon as I killed it, so as not to have it touched, at least until I got it to the shop. I would quarter the carcases of beef, but not divide them further; I should keep them in sides as long as I could; on a railway of course I could not do this—the carriage would not be high enough, and I should have to cut them—to quarter them—but I would not cut them smaller than quarters. I think that is the best way of sending meat. There is considerable loss to a butcher from change of weather, but we lose more in winter than in summer; the wind wastes it a good deal—more juices dry out of the meat; there is an invisible waste always going on in meat, particularly in wind and frost. The object of admitting air after the meat is killed is for coolness, not for any other object. The absence of air is of no importance, provided coolness is obtained; the air is used simply as a means of producing cold, but damp must be avoided. The waste I spoke of just now arises from hanging in the air; any contrivance which would keep the meat sweet, without subjecting it to a current of air would be a great gain in my business, supposing I had room for the purpose.

Mr. Chester—Professor Gamgee believes that meat killed according to his plan, will keep six weeks, even without being afterwards immersed in any preservative gas.

Mr. Slater—I do not know what is lost in weight by evaporation; I have never tried; mutton, however, wastes more than beef. There is no loss to the buyer at all, because it is only the water that is driven off; there is a loss to the butcher. This loss, in winter, is simply the loss of weight, and the loss in summer is the absolute destruction of meat from being putrid.

Mr. Wilson—What becomes of the offal—the hearts, and things of that kind? Do you find a sale for them?

Mr. Slater—Yes; they sell very readily. In the winter time they sell very well; in summer time, of course, we can never be over-nice about price; if anybody offers a fair and reasonable price they are sold.

Mr. Wilson—On an average, through the year, how much per pound?

Mr. Slater—We do not sell them by the pound, but by the lump. I will, however, let you know; I will go carefully through all, and weigh them. I sell them all at Kensington. I encourage people there to come for them; at the other shops, not killing there, the people have never had that sort of thing exposed, or rarely, if ever; and therefore they are not asked for.

Mr. Michael—Do you make any arrangement for getting rid of the meat when it gets unsaleable as first quality, or is it entire waste?

Mr. Slater—We watch it carefully, that is all.

Mr. Michael—What do you do supposing it is just beginning to turn, so that you cannot sell it to first-class customers; is there any plan of selling that to another class of customers?

Mr. Slater—We do not expose it for sale at all. We boil it to get the fat and we save the bones. The meat is absolute waste. That is generally the plan adopted. It is not sold as a damaged article to make soup of, or for any other purpose. If in the market any meat is putrid and bad, the inspectors condemn it, and they take it away and boil it, because the fat is just as good for the tallow-chandlers, whether the meat is putrid or sweet, and the meat is buried, I believe. Supposing I have a very large stock, and I find, on looking over that stock at night, that some of it is beginning to lose its quality, there is no means of disposing of it at all. There is no class of customers on the look-out for that. There may be a low class of butchers who would buy it, but that is very exceptional. There is no organised system of getting this from the first-class butchers. I do not know of any plan adopted of selling the meat at a lower price, when it has lost its first quality, to a lower class of customers. It is either sweet and wholesome, or bad. I can make no distinction. There is no intermediate state. In fact, it is a butcher's business to keep it just long enough, and not too long. It cannot be used by cutting off the external surface. It generally goes inside first. It goes first at the kernels and veins; in summer time we open all the kernels, and take them out, or let the air into them. If the kernels were removed, sometimes a leg of mutton would be good which otherwise would not.

Mr. Wilson—In the case of the large quantity of dead meat that comes up from the country, does the offal of that dead meat come up, or is it sold where the slaughter takes place?

Mr. Slater—Some comes up, and some is sold at the place of slaughtering. Nothing like half comes up; it is only from some districts, where they have no sale for it, that it comes.

Mr. Chester — Is there any difficulty, in consequence of the butcher's joints being cut in a different way?

Mr. Slater—Every county and town has a different way of cutting up meat, and you may as well try to change a man's name as to alter it. I think the Scotchmen have at last been persuaded to take out the kidney fat. I asked a salesman "why don't you write to these people to take the kidneys out of these sheep, for if they would take them out the meat would keep?" and he said—"You have only to ask a man to alter his plan to lose his business." But some of them gave in to the sensible plan of taking out the kidney, or even removing it altogether, and the meat is good.

Mr. Shaw—Have you heard anything of the plan of bringing meat from the south of Ireland, fresh meat, not salt, by means of fast steamers?

Mr. Slater—I have heard that Mr. Wood, of the Great Western Railway, was very sanguine about it, but I do not know whether it will be remunerative.

Mr. Chester—Does much bad meat come from Holland?

Mr. Slater—Not much. It depends altogether on the passage and the way in which it is brought. If it is brought from Holland not properly packed, and there is a bad passage, it ships a lot of water, and nothing is worse than sea-water for meat. Some comes from Scotland by rail, and some by boat, and that which comes by boat is not so easily disposed of.

Mr. Shaw—You always know where meat comes from?

Mr. Slater—Yes; I know exactly, by the appearance, what country it comes from, and all about it, by the shape of the meat. Some meat came from Holland last year in very good order indeed, some came in very bad order; it depends very much how it is managed. We have had very good meat from Holland this year.

Mr. Chester—Do you do much in the way of salting meat?

Mr. Slater—Not with any idea of salting it for preservation. I merely salt for my own trade.

Mr. Chester—What is the loss of weight in meat that has been salted?

Mr. Slater—I never tried. It would depend on whether it was left to drain.

Mr. Michael—Under any circumstances the salt meat must lose a great quantity of juice, which is turned into brine. Do you adopt the dry principle?

Mr. Slater—There is dry salting; some people prefer it. If you dry salt meat it will make a gravy just the same. I never tried the difference between the wet and dry salting. I will try it. I will take two pieces, and dry salt one and wet salt the other, and give them both the same time.

Mr. Chester—Is there any difference in the amount of difficulty in managing the meat which you kill yourself and that killed in the country?

Mr. Slater — Generally, the country butchers are very clean dressers. There is not much difficulty in that way.

Mr. Chester—Do you know how long it has been killed; and when you get it is there any certificate, or any thing of that sort?

Mr. Slater—None at all; you can tell by the appearance for a day or two, but after that you cannot. Scotch meat is better, on account of being killed in a cooler climate; and besides this, the cattle are not killed after a long railway journey, and they are in a quiet state. A great deal depends upon what state the animal is in when he is killed whether the meat will keep.

Mr. Read—What do you generally find is the fact as to meat killed in the country in a quiet way, and the cattle you have here from the London market after they have gone a long journey?

Mr. Slater—I keep them at home a short time before I kill them; I do not kill them what we call "off the drift;" if killed as soon as they arrived the meat would not keep. I keep them until the next day, and that is sufficient. They soon get quiet and settle down.

Mr. Shaw—I understand you to say that meat cannot be brought up in a good condition in the summer, on account of the heat. If that mode of transit could be improved, that objection would be met?

Mr. Slater—Certainly.

Mr. Chester—If there were special vans constructed, admitting air but not dust, and kept at a low temperature, either by a small quantity of ice or by means of evaporation, might not meat come in very good condition a long way?

Mr. Slater—I do not think ice good for meat. I have an ice-house myself; and I used it for two or three seasons, but last season I dispensed with it, because the action of the air alters the appearance of the meat directly you bring it out. You have a joint of meat and you bring it out to all appearance beautiful and firm, and clean, as when you first put it in; it remains in the shop say for an hour, and you then see a sweat on it, and it takes up every particle of dust and everything which touches it, and when it gets to the customer's house it is objected to.

Mr. Chester—What temperature is your ice-house?

Mr. Slater—About 40 or 45 degrees. If by any artificial means in the vans you could create a cool air, it would no doubt be beneficial.

Mr. Chester—Does your principal supply of live meat come consigned to you, or do you go into the market and buy it?

Mr. Slater—I get a great deal consigned to me, and I go into the market and buy what I want besides. It comes from different gentlemen, not graziers in business, but gentlemen who have so many bullocks and so many sheep. They write and say they have so many ready, and they are going to send them up.

Mr. Shaw—It was said, after the passing of the free trade measures of Sir Robert Peel, that they had not produced any effect on the price of meat, for this reason, that foreign meat did not compete with the best English meat, and was not used for the tables of persons who wanted the best articles, but that a new class of meat consumers were brought into existence. Is that your opinion?

Mr. Slater—It is. I do not think foreign meat will ever compete with first-class English meat, but it will set so much more first-class meat at liberty, so to speak, for the higher tables. In time we may get better meat from abroad, when herds are improved, and they are better fattened. There is nothing in the transit which necessarily makes the meat inferior if properly managed. I certainly do not like beasts coming from abroad, from the mere fact of their having had a sea voyage. I do not think it does them any good; I think it affects a bullock or a sheep the same as it does a human being. The dead meat comes better. I should rather buy it dead than alive.

Mr. Wilson—Do you think, from your experience, that the meat can be sufficiently ventilated during a long railway transit without the accumulation of dust to any disagreeable extent?

Mr. Slater—I do not think it can, unless a van were so constructed as to completely exclude dust, and still let in air. Canvass sides would stop a great deal of it.

Mr. Read—When you said you did not like foreign cattle because they came by steamboat, of course that would apply to those which came by sea from Scotland and Ireland?

Mr. Slater—They are as bad as foreigners.

Mr. Read—You think Irish cattle had better be killed there if possible, and sent dead?

Mr. Slater—Yes; if they would come in a good state. The objection to the dead meat trade from Ireland would apply more in the summer than in the winter unless you

had a quick transit for it. There is no reason why meat coming from Ireland should not be as good as that coming from Scotland.

Mr. Wilson—Is there any tendency to the establishment of large slaughtering-houses, out of London, but short of a long railway transit? It seems to me that, with the difficulty of conveying dead meat, and the difficulty of slaughtering in London, it would follow that somebody would find it worth while to establish large slaughtering places at short distances out of London, and without involving a long railway journey. Is there any tendency in that direction?

Mr Slater—I think if you were to establish large slaughter-houses of that sort, and get rid of private slaughter-houses altogether, you would get two distinct trades. A butcher as he is now would not be a butcher then, he would be a purveyor of meat. I for one, if you did away with my private slaughter-house, would not kill at all. I would stand the chance of buying it dead. There is a great objection to have abattoirs by butchers. They like to have their private slaughter-houses; they object to slaughter-houses not under their own control. I would never buy another live animal, if I could not kill it at home. Of course an animal brought out of the field, from his own natural pasture, and killed quietly in a man's own slaughter-house, would be in a better state than if he were conveyed to London. Even when he is sent home to my place and kept a few days he does not recover the same degree of quality—he has lost a certain portion.

Mr. Read—But with regard to the question—if a bullock had to come a certain distance by rail to a certain great centre, it would be almost as bad as killing in London would it not?

Mr. Slater—Yes.

Proceedings of Institutions.

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THE AGRA EXHIBITION.

In continuation of the history of this exhibition of the North-West Provinces of India, which has already appeared in the *Journal* (see pp. 181 and 265), the following account of the closing is condensed from the local papers:—

The Lieutenant-Governor officially closed the Exhibition on Saturday, the 9th February, when the ceremony was performed in the open air. He made a speech, showing how these industrial exhibitions excite an interest among the natives of all countries. After a few lines of exordium, he proceeded to say:—

"To all those who have seen this exhibition, it will, I doubt not, have commended itself, by its intrinsic excellence, far more effectually than any words of mine could hope to do, but I do not fear to say that, looking at the means at our command, and the cost which has been incurred, no more effective effort has yet been made out of Europe, to realise the true objects of such an undertaking; for not only have we here an admirable collection of the most valuable and interesting articles in almost every department of industry and art, but we have also, in the buildings and grounds and general arrangements, a most striking and practical exposition of the almost magical facility and rapidity with which well-directed energy and skill can transform the common things around us, the raw materials, the barren plain, into the most harmonious combination of utility and ornamentation, which at once instruct and gratify the taste and the imagination, and by their practical usefulness materially contribute to the real progress of the objects we have in view. All honour, then, to those to whom we are so greatly indebted for the success which has now been achieved. To yourself and the gentlemen of the Central Committee I have already expressed my obligations. I desire now more particularly to thank Mr. Sibley for the design of the central building, which, with the skilful aid of Mr. Cole, has formed the principal feature of the exhibition, and has certainly excited as much wonder and interest in the minds of the natives, as the more costly contents which it protects. To the Board of Agency, E. I. R., I would express my acknowledgments for the readiness and liberality of their assistance. To the exhibition staff, who have borne the burden and heat of the day, whose labours have been as unceasing as their anxieties, and only to be guaged by the success which has attended them, no words of mine can adequately convey the commendation which I feel to be their due. Mr. Pollock, Colonel Rowlatt, Dr. Playfair, Mr. James Simson, Dr. Moir, Lieutenant Cole, Mr. Webb, and Mr. Adams, have each and all fulfilled the task entrusted to them with a degree of ability and success which cannot be too highly praised. Most cordially I thank them one and

all. I consider the general result of their efforts to be deserving of the highest prize for merit of all that has been here exhibited. I hope to convey to them hereafter a separate memento of the occasion; that highest prize, which is, I doubt not, that which they covet most, success, and the public appreciation and acknowledgment of that success, is theirs now. To Mr. Pollock belongs the merit of the chief executive control and organization of the whole exhibition. I desire especially to acknowledge and to thank him for the ability, unwearied perseverance and determination to succeed, the energy and forethought, the zeal and talent for organization which distinguished his management and assured our success. To Colonel Rowlatt we are most especially indebted for the wonderful creation of the gardens, the tasteful ornamentation of the grounds, the band-stand, fountains, and many other evidences of taste, and fertility of resource, to which so much of the success of the exhibition is due. Among other things, for the musical part of the opening ceremony, which added so much to our gratification, and for which I would take this opportunity of offering my grateful thanks to the ladies and gentlemen who joined so kindly and effectively in its execution. To Lieutenant Cole we are under the greatest obligations for the beauty of the Central Hall, its internal decorations and artistic embellishment, the tasteful machinery sheds, and many other parts of the arrangements. We have been most fortunate in obtaining his services, of which I hope we may have the opportunity of still further availing ourselves, for the purpose of securing a permanent record of this exhibition. I cannot speak too highly of what has been accomplished by these gentlemen in the unity and simplicity, the elegance and taste, of all the arrangements of the structures and the ground. I desire also here particularly to notice with marked commendation, the valuable and effective services of Mr. Robinson, the Secretary to the Municipal Commissioners of Agra. To the Municipal Commissioners, to the several members of the mercantile community of Agra, and to the Tuhseeldar, my acknowledgments are due for zealous and liberal aid. The assistance rendered by the Governments of Bombay, of Bengal, and of Madras, the very valuable contributions of Mr. Temple, from the Central Provinces, of Mr. Justice Phear, Dr. Hunter, and many others named in your opening address, deserve a more ample recognition than time will at present allow me to give them; to all I desire to return my most hearty thanks. To Mr. Temple and Mr. Dowleans we are more especially indebted for most effective aid, and I regret that circumstances have prevented our seeing them among us this day. I have to acknowledge the very hearty and able assistance which this exhibition has received from so many of my native friends, from the chiefs, the local committees and gentry generally of the country. I trust that they have not only been amused, but have profited by the exhibition. I am sensible that it has occasioned many of them an amount of trouble and expense, which must greatly enhance our estimate of the liberality with which most of them have supported it. It is most satisfactory to me feel that this aid has not unfrequently been given from a true appreciation of our objects and a real desire for the practical advancement of the people."

The Lieutenant-Governor then proceeded to name those especially among the native gentlemen who were the most distinguished in aiding the undertaking, and concluded as follows:—

"I must add a few words upon the great success of the experiment of free admissions, upon which many doubts were entertained. Nothing could have been more orderly than the crowds which have daily flocked to the grounds, and it is remarkable how intelligent has been the appreciation generally of the exhibition; the wonderful crowds of women and of children evincing the perfect confidence of the people. There has been no mischief or damage of any kind. The practical remark has been that they have not time enough to study what they see, a real drawback, which it will be my endeavour to remedy in some measure by a well-prepared catalogue of the articles, which may hereafter be translated into the vernacular. I will only add a few words of commendation of the police and sanitary arrangements, the former under the immediate direction of Captain Dennehy. All have been most excellent, and reflect the highest credit upon those who have organised them. I believe there has not been a single case of loss of property. And now, before concluding, I must say a few words of acknowledgment to all around me, and to the visitors generally, for the large measure in which they have contributed by their presence and deameanor to the success of the exhibition. Hitherto on such occasions the difficulty has been to get the people to come. Now all press in of their own accord. There have been no complaints of any kind; on the contrary, I am told that all are thoroughly satisfied, and speak in high terms of the courtesy and consideration with which they have been treated. I regret that our meeting has been so brief. I trust, however, that while many have benefited, all have been gratified by what they have seen during the past week, and that they will retain a pleasant recollection of this exhibition. Such an event is not likely to recur in these provinces for some years to come—local associations will be left to work up to the present model. I trust, however, that the next that may be held, whether organised by government, or by private enterprise, may as much excel the present as this surpasses previous efforts; but, however that may be, it cannot, I think, prove more creditable to those who execute it, or more successful in its immediate effects. I now declare this Exhibition closed."

OPENING OF PUBLIC AND PRIVATE COLLECTIONS DURING THE PARIS EXHIBITION.

The Museum of Antiquities in the Louvre, at least that portion of it which is contained in the ancient apartments of Anne of Austria, beneath the Galerie d'Apollon, has been completely renovated and re-arranged, and its opening has been announced.

The new library and reading-rooms of the Bibliothèque Imperiale are finished, or nearly so, and to be opened during the present month. By the new arrangement there will be a common reading-room for the public, open to all the world, according to the practice of this institution, and a second reading-room, with much greater facilities for reference and study, for men of letters and students. The innovation will present a subject deserving of study and consideration, for the giving of more facilities to literary men, without detracting from those of the public, is a problem that is well worth the trouble of solving.

Prince Napoleon throws open his artistic collections in the Palais Royal to the public five days a week, during the exhibition season; cards of admission to be obtained by application in writing, addressed as follows:—"à M. Hubaine, secrétaire particulier de Son Altesse Impériale;" or, "à M. Brançon, intendant, Palais Royal, cour de l'Horloge."

The announcement of the opening of the museum of arms and ancient armour, lately formed in the restored château of Pierrefonds, is confirmed. The early part of May is the time fixed upon. Excursion trains will be arranged for the same period. A visit to Pierrefonds will have other attractions besides the new museum; the Château is one of the feudal castles of France, restored by M. Viollet-le-Duc, and the country around is fine.

The great new park of the Buttes Chaumont was opened on the 1st inst. This pleasure-ground is of large extent, and occupies the site of the old plaster quarries, the irregularities of which have been turned to picturesque account. The chief objects of interest are a reproduction of the Temple of the Sibyl, and a fine waterfall, lakes, and canal; there are five bridges, one a

beautiful light specimen, on the suspension principle, three restaurants, six ornamental houses and lodges for the keepers, some of them decorated with *faïences*, grottos, three plateaux, commanding fine views, and a mound planted with fine cedars. The circular railway passes through the new park.

Fine Arts.

Art at the Paris Exhibition.—The picture galleries contain for the most part a fair and full representation of national schools throughout the world. Four quarters of the globe and twenty-four countries are present. France, being at home, has peculiar facilities, and exhibits at her very best. Still, since the last Universal Exposition, in 1855, she has lost several great painters, whose pictures are now specially missed. Ary Scheffer, Ingres, Delaroche, Delacroix, Horace Vernet, Troyon, and Decamps can no longer be present in International Exhibitions. As a consequence, the character of French art is changed. Instead of pictures large and life-size, in place of works after the prescriptive type of high and historic styles, the tendency now is to compositions of romance and fancy. The most prominent exceptions come under the names of Yvons and Pils, who celebrate the glory and martial deeds of the empire. The English public have at home, in the galleries of Mr. Gambart and Mr. Wallis, become acquainted with the leading traits of the existing French school. Still, seldom have been collected at one time so many *chefs-d'œuvre* of leading contemporary painters. By Rosa Bonheur there are eleven pictures, by Gerôme seven, by Meissonier eleven, by Frère eight, by Hamon also eight, by the late M. Troyon seven, by Zeim four. These names and numbers indicate that the 625 pictures which constitute the gallery represent the French school in its strength and versatility. Two hundred and thirty painters, each of whom has already acquired acknowledged position, are present. Nevertheless, perhaps, as a grand national display the effect is a little scattered when compared with the Universal Exposition in 1855. Then were concentrated in separate rooms the noble and vast works of Ingres and Horace Vernet. No such climax is now reached. Nevertheless, it will be admitted that the French courts contain a full and faithful register of the national school, and that they present to the student a rare opportunity of forming a just judgment on the characteristics of French art. The same, too, may, with little reservation, be said of the choice though small collection of English pictures. Many names, it is true, are absent. Two leading painters, for example, who represent landscape art in the Royal Academy—Creswick and Lee—are not represented. Still, in the works of Linnell, father and sons, of Stanfield, Graham, and MacCallum, the supremacy of English landscape is fairly maintained. In other departments are recognised such well-known works as Elmore's "Tuileries," Phillip's "Gloria," or dance over a death, "Poole's "Song of Philomene on the borders of the beautiful lake," Millais's "Romans quitting Britain," Lewis's "Coptic-court, Cairo," O'Neil's "Eastward, Ho!" Armitage's "Queen Esther," Wallis's "Death of Chatterton," and Hunt's "Afterglow, Egypt." With the exception of the last, all these pictures were first known to the public in the Royal Academy. The art of water-colour painting, in which England is supposed to be supreme, is also tolerably represented, though, from the reluctance of owners to allow valued works to leave the country, far less fully than in London in 1862, or at the Art Treasures, Manchester. Well-selected works have, notwithstanding, been obtained of many leading masters, such as Cox, Davidson, Gilbert, Haag, Haghe, Holland, W. Hunt, Smanfield, Tayler, Tidey, Topham. The total number of oil pictures and water-colour drawings in the English court is 300, or less than one-half the total in the French; this, if numbers were the only criterion, would give to England an adequate proportion, seeing that France occupies not less than one-half of the entire building. The large size, however, of French pictures generally still further gives to France the advantage over any other nation. The preceding data will indicate the extent, variety, and value of the contents of the picture galleries. We shall add from time to time further evidence of the extraordinary art riches and resources of an exhibition which, because found in an unfinished state, has not been appreciated at its high worth.

Manufactures.

Diamond Boring Machine.—The diamond has been frequently used for turning up porphyry and other hard stones; the late M. Leschot, in 1862, took out a patent for the employment of this mineral in boring hard rocks. Every one knows the difficulty of boring stone of an exceptional hardness with ordinary tools. The work is excessively slow, and it is with difficulty a passage is opened. It appears that the employment of the diamond has completely changed this state of things, and has allowed working with rapidity in circumstances where the employment of ordinary means would have rendered the work to be accomplished almost impossible. In following the process of M. Leschot, M. Pichet has constructed a boring machine of great power. It is composed of a steel ring set with black diamonds. In order to use this apparatus it is only necessary to make the ring rotate, and press against the rock to be perforated. It is easy to understand the action of the apparatus; the diamond grinds the stone, and consequently, by means of its circular motion, a cylindrical ring of rock is reduced to powder. A current of water carries away the fragments of the boring as quickly as they are produced, so that the work is proceeded with very rapidly. The borer does not hollow out a hole in the stone, but a cylindrical ring, the adhering core of rock then remaining in the tube, can easily be detached by the blow of a mallet. It is easy to see that, only having to powder a circular ring of rock, the motive power need not be considerable, and the length of the operation would not be great. M. Pichet's apparatus is now being employed at the tunnel of Port Vendres; it is moved by hydraulic power, and by its use it is said that 1·2 metre of rock is pierced per hour. The black diamond employed for this operation wears but little, and when it can be no longer used for the purpose it is reduced to powder, and employed in polishing precious stones.

Coal Mines in Poland.—Borings are continued the whole length of the railway lines in the kingdom of Poland; these operations, which have already led to the discovery of four seams of coal, have now obtained a still further success, as a fifth seam has just been found at Dombroff, and a sixth in the forest of Stoheneschiton.

Commerce.

Tea Cultivation in India.—The unsatisfactory state of tea cultivation in India at the present day (says the *Produce Markets Review*), and the unfortunate condition of the planters, after having been freely commented upon in all quarters, seem at last to have come under the notice of the Indian Government; and acting upon certain representations which have been made to him, the Lieutenant-Governor of Bengal proposes that some concession should be held out to the tea-planters, in order to enable them to retrieve in some measure the losses which they have been incurring for some years past. The remedy suggested, "that purchasers of lots under Waste Land

Rules, who have not completed the payment of the purchase money, should be allowed to throw up one or more of their lots, and to carry the amounts already paid as instalments to the credit of other lots of waste land," does not seem sufficient either to obviate the real difficulties with which the question is beset, or to afford to planters the relief they so much need. Indeed the whole measure is characterised by a hesitating and uncertain irrelevancy which is calculated to call forth the opposition of all parties. Many aver that, as a private speculation, tea-planting should be left to take its chance of commercial success with all other schemes carried on by individuals; but we would suggest that the very nature of the undertaking elevates it from the list of private enterprises to the dignity of a question in which an almost national interest is created. Those, however, who find fault with the insufficient character of the relief in prospect, should remember that in this apparently small instalment a principle is involved, and that when once the condition of the planter is made the subject of official inquiry, the labour question and its direct bearing on the planter's interests are necessarily involved. Hitherto the sympathies of the Indian Government, so far as they could be said to be enlisted at all, have undoubtedly been on the side of the "coolies;" and, whilst nothing was too bad to be laid at the door of the employers of labour, everything was to be done in favour of the employed. Laws were passed; special officers appointed; extraordinary means were taken—all to secure the well-being and prosperity of the "coolie;" whilst the planter—it was tacitly inferred—might safely be allowed to trust to his own resources so far as regarded his tea-planting career, and be left to make the best shift he could against the overwhelming odds of a race of labourers steadily backed by the whole weight of Government authority. The turn of events during the last few years has shown how widely the Government has erred in this matter, and how impotent for the general good all protective measures must be designed to elevate one class at the expense of any other. These views, as we learn from the *Calcutta Englishman*, have lately been put forward with great cogency by the commissioner appointed by the Bengal Government to inquire into the condition of coolie labour in Assam and Cachar. "Had the commissioner," remarks the *Calcutta Englishman*, "been a planter himself, he could not have expressed himself in stronger language or more to the purpose; in almost every paragraph he condemns legislative interference." The commissioner avers that the labourer should be treated as a free agent, and that he ought to be left to make his own terms with the planter, whose real interest it would always be to maintain his labourers in the highest degree of health and efficiency. On these grounds he would recommend the unconditional repeal of all laws regulating the rate of wages, conditions of living, &c., leaving these matters to be settled by contract between the parties themselves without any official interference or supervision. "You can no more make tea grow," he remarks, "by Act of Parliament, then you can make an unwilling or unworthy man provide for the proper discharge of his duty by penal laws." As soon as these views are understood and accepted by the Indian Government the planters will have some prospect before them of recovering their losses; but it is useless to expect any improvement whilst the impediments to their free course are so eagerly taken up, and so sedulously fostered by those who hold the rule and the prosperity of India in their hands.

Colonies.

Border Duties, Victoria and New South Wales.—The vexed question of these duties has been arranged by an intercolonial conference held at Melbourne. The Victorian Government have undertaken to pay New South Wales £60,000 per annum for five years, and £6,800 arrears due since 1864. Free trade in the products of either colony is also guaranteed while the treaty is in force. By this new arrangement the Victorian merchants are secured the import and export trade of the whole of the Riverina, without that amount of competition with South Australia which they have hitherto had to compete with.

New South Wales Revenue.—The total revenue of this colony for the year 1866, exclusive of loans and special receipts, was £2,038,079. As there are about 400,000 people in the colony, this shows that the revenue obtained is at the rate of about five pounds a head. The increase on that of last year is £263,904. Out of this no less than £248,636 is due to Customs alone, so that the other sources of revenue have had very little to do with the restoration of the public credit. The Customs revenue gives a shade over £2 per head of all the population. Two-fifths of the whole, therefore, comes from it, and indeed, with the exception of licenses, this is about all that can be properly called taxation; and of this amount very nearly one-half is duty on intoxicating liquors. The new tariff has increased the revenue from spirits, and also from ale and beer. The taxes on rice and dried fruits also bring in nearly £20,000 a year. The duties on tea and sugar yielded £96,000, and this was £30,000 below the yield of the previous year, and as much below the estimate—a fact due to goods being taken out of bond in anticipation of an enhancement of duty. The revenue of the Post-office is £77,000, which is an increase of £6,000 on the revenue for 1865. The railway receipts were £176,246, which is an increase of nearly £13,000 on the return of the previous year, and an advance of over £4,000 on the estimate. The telegraph receipts are nearly £34,000, which is somewhat over the estimate, and an advance of over £3,000 on the previous year. The total disbursements for the year amounted to £2,100,820, being a little over the income.

Gold Discovery in Queensland.—The government of Queensland has offered a reward of three thousand pounds to any person or persons who shall, individually or jointly, make discovery of a gold field situate at least twenty miles distant from any gold field already proclaimed within the colony. Such reward will be payable as soon as it shall be shown that the field so discovered has attracted to it, and supported for the space of six months, a population of not less that 3,000 persons.

Progress of New South Wales.—The progress of the colony of New South Wales during the last twenty years has been far greater than was anticipated at the commencement of it. In the year 1846 the population was less than 200,000, which included the districts of Port Phillip and Moreton Bay. The following are some statistics. There were in

	1846.	1866.
Schools	394	1,069
Scholars	19,033	53,453
Mills	138	175
General	124	—
Manufactories	—	2,133
Tillage area	183,360 acres	379,254 acres
Horses	88,126	282,587
Horned cattle	1,430,736	1,961,905
Sheep	7,906,811	8,132,511

Twenty years ago New South Wales was unknown as a gold-producing country, but it now exports that metal to the extent of £2,647,668. This state of prosperity was indeed in the second year of its auriferous development, and it has not yet in any year much exceeded the amount then reached; but during the next twenty years a greater increase may be expected, as machinery is increasing, and the mining appliances are at present rude and wasteful. There is an immense increase in the expenses. In 1846 this was £290,000, and it had in 1866, reached £2,314,794. This latter sum includes the loan expenditure, but it shows how large a sum the government annually expends, being at the rate of

nearly £6 per head of the population. Even without the loan expenses the expenditure exceeds £4 per head.

Wine-growing in Victoria.—The consumption of colonial wine is rapidly increasing, and if the next vintage proves equal to the present anticipations, colonial wine will be placed in the market at a price and of a quality that only France can compete with. In 1866 the wine cultivation increased from 1,307 acres to 18,063 acres. The number of vines of three years and upwards increased from 3,109,735 to 3,781,169, thus 671,414 additional vines came into bearing during the year. The grapes gathered amounted to 49,749 cwt., of which 31,686 cwt. were made into wine or brandy, producing 176,959 gallons of the former, and 795 of the latter. The land under other crops last year amounted to 1,705 acres, against 1,264 in 1865. The area under garden cultivation, was 6,654, against 6,627 acres; and orchards 3,419 acres, against 2,364 acres in 1865.

Obituary.

M. Hittorf, an architect of deserved reputation, and many years occupied with government works, died recently in Paris at the age of 74. He was pupil of Percier and Belanger, and made himself remarked by his attempts to restore polychromatic architecture. His principal works of this class are the church of St. Vincent de Paul and the circus in the Champ Elysées. He arranged the Place de la Concorde, the place of the Arc de Triomphe, and built the new Paris terminus of the Northern Railway. M. Hittorf was a member of the Academy, and author of works on the architecture of ancient and modern society, on the polychromatic architecture of Greece, and on the antiquities of Attica. The last has been published in English.

Notes.

Pneumatic Dispatch between the Bourse and the Grand Hotel in Paris.—This tube is the commencement of a system which is to extend under ground throughout Paris, based on a principle which up to the present time has not been applied as a useful means of propulsion. It is not the atmospheric pressure which acts on the piston from behind with a vacuum in front, but it is the elasticity of compressed air which supplies the necessary propelling force, and this process gets rid both of an exhausting machine and the steam power. The compression of the air is obtained by means of water furnished by the reservoirs of Paris, the power of which is equivalent to a head of 15 metres. To produce the result three vessels of sheet iron, each holding 4,500 litres, are fixed; the first is intended to receive the water and to give the pressure, the two others receive the compressed air. A large cock allows the water brought from the subterranean pipes to penetrate. As the vessel fills, the air which it contains is compressed and driven back into the two others, in passing through a tube furnished with a valve which prevents its return. When the water has entirely filled the vessel, it is allowed to run out by a second cock, whilst a valve applied to the upper side, which is lowered by means of a lever, allows the outer air to enter as the water runs out. By filling the vessel a second time with water, a fresh quantity of air is added to that already compressed, and a pressure of about two atmospheres is thus obtained. The two offices are connected by a cast iron tube about 1,060 metres long, the interior diameter, $2\frac{1}{2}$ inches, opening at each extremity into an hermetically sealed chamber by a door which allows the introduction or withdrawal of the piston carrier containing the dispatches. This piston consists of a hollow brass cylinder, $5\frac{1}{2}$ inches long at one extremity, and furnished at the other with a moveable lid. It will hold about 40 dispatches placed in envelopes. Before sending off a dispatch an electric bell gives a signal to the correspondent at the opposite end, who answers by signal that the way is clear, that is to say, in communication with the outer air. The cylinder containing the dispatches is placed in the opening of the tube, which is closed by the turn of the handle, and communication is made with compressed air. The piston, smartly driven back, drives before it the air in the tube, and arrives at its destination in about 60 or 80 seconds. Whilst one station gives the pressure, another can send the message, so that 5 minutes is sufficient for a journey and return of the piston. This system obviates stoppages between stations.

MEETINGS FOR THE ENSUING WEEK.

Mon.....London Inst., 7. Prof. Westwood, "On Entomology."
Tues ...Medical and Chirurgical, 8½.
Ethnological, 8. 1. Dr. Collingwood, "Visit to the Kibalan Village of Sano Bay, north-east coast of Formosa." 2. Mr. John Crawfurd, "On Colour of the Skin, Hair, and Eyes, as a Test of the Race of Man."
Wed ...Society of Arts, 8. Mr. S. J. Mackie, "On the Construction of Iron Ships, and their Preservation by Zinc Sheathing."
London Inst., 12. Annual Meeting.
Microscopical, 8.
R. Society of Literature, 4½. Annual Meeting.
Archæological Assoc., 8½.
Thur ...London Inst., 7. Prof. Bentley, "On Botany."
Mathematical, 8.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 29th March, 1867.

74. Bills—Bankruptcy.
75. ,, Judgment Debtors.
76. ,, Bankruptcy Acts Repeal.
83. ,, Public Houses Regulation.
87. ,, Petty Sessions (Ireland) Act (1851) Amendment.
92. ,, Public Libraries (Scotland) Acts Amendment.
98. ,, Alimony Arrears.
94. ,, Sale of Land by Auction (as amended).
152. Army (Gun Cotton)—Detailed Account.
153. Volunteers—Circular Letter.
164. Civil Services—Supplementary Estimate.

Delivered on 30th March, 1867.

80. Bills—Turnpike Trusts.
97. ,, Traffic Regulation (Metropolis).
99. ,, Canada Railway Loan.
46. (II.) Trade and Navigation Accounts (February 28th, 1867).
140. Railways—Return.
151. Army (Staff College Examinations)—Return.
165. Waterford County Election—Return.
166. Police (Waterford)—Correspondence.
Public Petitions—Twelfth Report.

Delivered on 1st April, 1867.

95. Bill—Sale of Liquors (Ireland).
96. ,, Sale of Liquors on Sunday.
78. (IV.) Committee of Selection—Fifth Report.
126. Scurvy—Correspondence.
163. Sugar—Return.
168. Greenwich Hospital—Return.
169. Court of Common Pleas—Returns.

Delivered on 2nd April, 1867.

89. Bill—Public Health (Scotland).
100. ,, Hypothec Amendment (Scotland).
101. ,, Railway Companies (Winding-up) (Ireland) (corrected copy).
75. (II.) Societies—Return.
150. Militia Regiments—Return.
173. East India Railway Company—Letter.
The "Queen Victoria"—Correspondence.
The "Tornado"—Correspondence (Part V.).

Delivered on 3rd April, 1867.

157. Fortifications—Return.
162. Sanitary Science (Ireland)—Correspondence.
Public Petitions—Fourteenth Report.

Delivered on 4th April, 1867.

103. Bill—Sale and Purchase of Shares (as amended).
164. ,, Fortifications (Provision for Expenses).
172. Tay River—Report of Commissioners.
Russia and Rome—Despatch of Prince Gortschakoff.

Delivered on 5th April, 1867.

106. Bill—Sunday Lectures.
107. ,, Bunhill-fields Burial Ground.
177. Navy (Marine Officers)—Correspondence.

Session 1866.

145. Government Insurances and Annuities—Accounts.

Delivered on 6th April, 1867.

148. East India (Tariff Valuations)—Supplement to Gazette of India.
186. Traffic Regulation (Metropolis) Bill—Lords' Report, Minutes of Evidence, &c.

Public Petitions—Fifteenth Report.

Delivered on 8th April, 1867.

106. Bill—Sunday Lectures (corrected copy).
108. ,, Chester Courts (as amended).
109. ,, Burials (Ireland).
78. (v.) Committee of Selection—Sixth Report.
158. Seamen's Wages (British Ships)—Return.
182. Militia Barracks and Regiments—Returns.
184. Volunteer Capitation Grant—Report.
188. Telegraphic Communication—Treasury Minute.
The "Tornado"—Correspondence (Part VI.).

Delivered on 9th April, 1867.

178. Navy (Vessels of War)—Return.
179. Navy (Promotions)—Return.
201. Whiteboy Acts—Circular.
207. Small Tenements Rating Act—Return.
Public General Acts—Cap. I. to X.

Delivered on 10th April, 1867.

112. Bill—Libel (as amended).
0·86. Tenants Improvements Compensation (Ireland) Bill (1852)—Reprint of Session 1852.
170. Post-office Savings Banks—Account.
174. Westminster Abbey—Correspondence.
204. Army (Surgeons)—Returns.
213. Immigrants and Liberated Africans—Return.
214. Coolie Immigrants (Demerara)—Return.
Manufactures, Commerce, &c.—Reports by Her Majesty's Secretaries of Embassy and Legation (No. 3).

Delivered on 11th April, 1867.

115. Bill—Representation of the People (Ireland).
119. ,, Corrupt Practices at Elections.
146. Navy (Pig Iron)—Messrs. Ryland's and other Reports.
171. Navy (Channel Fleet)—Admi. Yelverton and Admi. Warden's Reports.
194. Public Income and Expenditure (31st March, 1867)—Account.
208. Libel Bill—Report.
Public Petitions—Sixteenth Report.

Delivered on 12th April, 1867.

116. Bill—Game Laws (Scotland).
119. ,, Corrupt Practices at Elections (corrected copy).
120. ,, Mixed Marriages (Ireland).
161. Metropolitan Police—Returns.
180. Navy (Channel Squadron)—Report.
192. Registration of Deeds (Ireland)—Account.
199. Oyster Fisheries (Ireland)—Account.
202. Robert Sim—Depositions, &c.

Patents.

From Commissioners of Patents' Journal, April 12th.

Grants of Provisional Protection.

Animal and vegetable substances, preservation of—846—J. and A. Gamgee.
Armour sheathing, &c.—856—Joseph Betteley.
Bale fastener—858—H. Fassmann.
Boilers—757—T. Dunn.
Bottles, casing for—797—W. McAdam and S. Schuman.
Breaks, railway—807—G. A. Laurent.
Buttons, &c., securing—873—J. Hesse.
Carpets, &c.—899—A. Turner and W. E. Newton.
Carriages—875—A. F. Langin.
Casks, &c., apparatus for cleansing—3391—E. Allen.
Cisterns—902—A. Mackenzie and S. Robinson.
Coal, &c., machinery for procuring—886—G. E. Donisthorpe.
Cork and leather, process for uniting, separately or combined—878—J. Toussaint.
Cultivator, land—862—R. Higgins.
Driving-bands—877—T. Unsworth.
Elastic web, &c.—930—W. Gadd and L. Baillon.
Envelopes—900—L. Foinquinos.
Fabrics, manufacturing—923—J. G. Tongue.
Fencing, iron and wire—874—E. O. Greening.
Fibrous materials, preparing—907—W. Crighton.
Fibrous substances, spinning, &c.—852—W. Busfield.
Filters—708—J. Fox.
Fire-arms—881—H. G. Riggs.
Fire-arms, breech-loading—863—A. Wyley.
Fire-arms, breech-loading—866—W. Clark.
Fire-arms, breech-loading—901—J. Wernell.
Fire-arms, breech-loading—913—W. Clark.
Flax, &c., preparing—711—W. Trimble.
Flax, &c., preparing—891—R. H. Collyer.
Floors, &c.—885—R. Moreland.
Fuel, artificial—935—J. Bird and J. Bird.
Furnaces—867—T. Wrigley.
Gauge, steam—871—G. Davies.
Heating apparatus—777—H. J. Newcome.
Hoops, skipping—854—J. G. Tongue.
Hoops, steel, for railway wheels—911—D. Foster and R. Cooke.
Iron, &c., manufacture of—888—H. Sharp and F. W. Webb.
Iron, &c., manufacture of—909—T. Roper.
Locks and keys—937—J. Wolverson.
Looms—883—E. B. Bigelow.
Manure—933—W. Clark.
Mines, &c., draining—860—W. Matthews.
Motive-power machinery—848—L. Horsfield.
Motors, hydraulic—641—P. R. Hodge.
Musical instruments—896—A. Findlay.
Musical instruments, wind—929—M. Henry.
Nuts, &c.—892—G. R. Postlethwaite.
Nut tapping machine—847—E. Watteew.
Painting machine—894—H. Fassmann.
Posts, &c., telegraph—887—C. E. Sohn.
Railways—868—W. Seaton.
Razor-strops, &c.—895—J. M. Laurent.
Rifles, projectiles for—884—G. Hookham.
Screws—876—W. R. Lake.
Semolina, manufacturing—917—G. A. Buchholz.
Ships, propelling—890—C. E. Brooman.
Ships, propelling—915—M. P. W. Boulton.
Ships, &c., propelling—749—P. Crause.
Ships, &c., protecting—903—W. R. Dawson and J. B. Davies.
Signals, railway—905—J. Arnold and G. Daniel.
Signals, &c., railway—870—J. Saxby.
Signals, &c., railway—927—W. Easterbrook.
Skates—931—W. B. Hilliard.
Steam-engines—882—W. E. Newton.
Steam-engines—897—J. Bruckshaw and C. Cornes.
Steam-engines—904—W. B. Nation.
Steam-engines, heating water for feeding the boilers of condensing—925—K. Barnes.
Stone-cutter—864—W. E. Newton.
Stoves—893—R. Howson.
Tanning apparatus—919—W. R. Lake.
Tools, edge—891—E. W. Shirt.
Venetian blinds—889—J. M. Jomain.
Watches, manufacturing—880—J. Wycherley.
Wines, &c., decanting—921—J. H. Johnson.
Wood-cutter—898—S. W. Worssam.
Wool, cleansing—872—A. C. Henderson.
Yarns, printing—850—W. J. Hanson.

Invention with Complete Specifications Filed.

Soap—1046—H. A. Bonneville.

Patents Sealed.

2382. J. Dunn.	2709. A. Parkes.
2652. A. Albini & F. A. Braendlin.	2727. S. Peddar.
2657. W. L. Wrey.	2731. J. Richards.
2664. D. Gilson.	2786. F. Tubino.
2668. J. Blaia.	2837. W. Geeves.
2671. A. Swan.	2853 E. P. North.
2672. J. Smith and J. J. Rowe.	3327. W. R. Lake.
2675. T. Woodward.	3359. C. Norrington.
2681. J. Slessor.	3372. W. Clark.
2684. J. Coates.	36. E. K. Dutton.
2689. W. Manwaring.	451. W. Harrison.
2699. J. Hosken.	464. G. Haseltine.
2700. C. E. Brooman.	

From Commissioners of Patents' Journal, April 16th.

Patents Sealed.

2693. W. E. Gedge.	2787. J. Gee.
2696. N. Grew and G. H. Money.	2827. J. J. Holden and S. J. Best.
2698. W. Simpson.	2899. C. Churchill.
2707. E. L. Simpson.	2904. W. E. Newton.
2708. C. Jones.	2923. W. E. Newton.
2712. J. H. Kidd & J. C. Mather.	2940. N. Korshunoff.
2717. T. Horby.	2975. W. W. Marston.
2719. F. Petitdidier.	3276. J. H. Grell.
2721. J. Day.	311. J. D. Bulloch.
2728. J. H. Johnson.	341. J. S. Hoar.
2734. R. Hollingdrake.	356. E. Firth.
2754. B. J. B. Mills.	394. W. H. Towers.
2768. W. Weldon.	593. G. Haseltine.

Patents on which the Stamp Duty of £50 has been Paid.

893. J. H. Simpson.	936. J. Bullough.
909. E. Dronke.	953. J. H. Johnson.
913. T. Chamberlayne.	941. H. Higgins.
927. W. Reading.	952. C. Doughty & W. D. Key.
931. J. Neilson and J. Gillies.	

Patents on which the Stamp Duty of £100 has been Paid.

905. T. H. P. Dennis.	935. M. A. F. Mennons.
899. J. Rigby & W. N. Norman.	922. J. Platt.
991. T. G. Dawes.	

Journal of the Society of Arts.

FRIDAY, APRIL 26, 1867.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'Clock :—

May 1.—"On a Machine for Type-writing." By John Pratt, Esq., of Alabama, U.S.

Cantor Lectures.

Mr. Hullah's course, "On Music and Musical Instruments," will be extended by two additional lectures, as follows :—

Lecture VII.—Monday, April 29.

Musical Instruments (*continued*).—The Bow—The Key-board—The Violin—The Organ—The Clavichord.

Lecture VIII.—Monday, May 6.

Modern Instruments, Chamber and Orchestral.—The Pianoforte—Combination of Instruments—The Orchestra.

The concluding lectures of Mr. Chaffers' course, "On Pottery and Porcelain," will be delivered as follows :—

Lecture VI.—Monday, May 13th.

English Pottery.—Fulham—Lambeth—Yorkshire—Shropshire—Liverpool—Staffordshire—Etruria—Wedgwood's Wares, &c.

Lecture VII.—Monday, May 20th.

English Porcelain.—Bow—Chelsea—Derby—Worcester—Liverpool—Wales—Plymouth—Bristol—Lowestoft—and other Manufactories—Battersea Enamel, &c.

The lectures commence at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend; tickets for this purpose are forwarded with the present number of the *Journal*.

Artizans' Visits to Paris.

The Council of the Society of Arts, feeling the importance of promoting the intelligent study of the Paris Exhibition and the manufacturing establishments in France by artisans of the United Kingdom, have appointed a Committee in furtherance of this object. The following gentlemen constitute the Committee :—

Rt. Hon. C. B. Adderley, M.P.
C. W. Aitken.
Edward Akroyd, M.P., *Vice-Pres.*
Sir W. G. Armstrong, C.B.
A. S. Ayrton, M.P.
S. A. Beaumont.
John Bell, *Memb. of Council.*
Professor Bentley, *Memb. of Council.*
Lord Berners, *Vice-Pres.*
Hon. and Rev. S. Best.
D. Roberton Blaine, *Memb. of Council.*
W. H. Bodkin (Assistant-Judge), *Vice-Pres.*
Sir J. P. Boileau, Bart., *Vice-Pres.*
R. K. Bowley.
Antonio Brady.
Rt. Hon. H. A. Bruce, M.P.
Decimus Burton.
C. Buxton, M.P.
The Earl of Caithness, *Vice-Pres.*
Lord Eustace Cecil, M.P.
R. L. Chance.
Harry Chester, *Vice-Pres.*
The Masters of the City Companies.
Henry Cole, C.B., *Vice-Pres.*
Robt. Coningsby.
Rt. Hon. W. Cowper, M.P.
Sir Francis Crossley, Bart., M.P.
J. Bailey Denton, *Memb. of Council.*
Lord de l'Isle and Dudley, *Vice-Pres.*
The Duke of Devonshire.
Charles Dickens.
James Easton, *Memb. of Council.*
C. W. Eborall.
Lord Ebury.
Lord Elcho, M.P.
William Fairbairn, F.R.S.
Professor Fawcett, M.P.
Peter Graham, *Memb. of Council.*
The Earl Granville, K.G., F.R.S., *Vice-Pres.*
The Earl Grosvenor.
Mr. Hansard.
G. W. Hastings.
Wm. Hawes, F.G.S., *Vice-Pres.*
J. Pope Hennessy.
Sir Rowland Hill, K.C.B.
Chandos Wren Hoskyns, *Vice-Pres.*
T. Hughes, M.P.
Blanchard Jerrold.
Rev. C. Kingsley.
Hon. A. F. Kinnaird, M.P.
Lord Henry G. Lennox, M.P., *Vice-Pres.*
The Bishop of London.
The Sheriffs of London and Middlesex.
Rt. Hon. Robt. Lowe, M.P.
Lord Lyttelton, *Vice-Pres.*
Archbishop Manning.
Henry Maudslay, *Memb. of Council.*
Rev. F. D. Maurice.
The Lord Mayor.
J. Stuart Mill, M.P.
Rev. Dr. Miller.
The Bishop of Oxford.
J. Slaney Pakington, *Memb. of Council.*
Right Hon. Sir John S. Pakington, Bart., M.P., *Vice-Pres.*
Alderman Sir B. S. Phillips.
Sir Thomas Phillips, Q.C., F.G.S., *Vice-Pres., Chairman of the Council.*
The Duke of Richmond.
Rev. W. Rogers.
The Marquis of Salisbury, K.G., *Vice-Pres.*
Titus Salt.
Sir Francis Sandford, *Vice-Pres.*
Colonel Scott, R.E., *Memb. of Council.*
The Earl of Shaftesbury.
Benjamin Shaw, *Memb. of Council.*
Sir J. P. Kay Shuttleworth, Bart., *Vice-Pres.*
S. Smiles.
Seymour Teulon, *Treasurer.*
Thomas Twining, *Vice-Pres.*
Alderman Waterlow, *Memb. of Council.*
E. W. Watkin, M.P.
G. Watts.
George F. Wilson, F.R.S., *Memb. of Council.*
Vice-Chancellor Sir Wm. Page Wood, F.R.S., *Vice-Pres.*

The Council, on the recommendation of the Committee, have passed the following minute :—

At the last and former International Exhibitions held in this country, arrangements were made by the French Government to facilitate the visits of skilled artizans, and interesting reports on the exhibitions were made by them to their government. Believing that such visits on the part of skilled workmen to these great international displays not only exercise a beneficial influence upon the men themselves, but also upon the progress of industry in the country to which they belong, the Council of the Society of Arts have resolved to raise a fund to be employed in aiding a limited number of English workmen to proceed to Paris for the purpose of studying the present French Exhibition.

To carry this object into effect, they have agreed on the following plan :—

1st. That a number of selected workmen (the number to depend on the amount of funds at the disposal of the Council) shall be assisted to proceed to and remain in Paris a sufficient time (say three weeks), for the purpose of making a careful study of the exhibition, and of such factories and workshops as they may desire to visit.

2nd. That every man so assisted shall, on his return, make a report to the Society of what he has observed during his stay, in reference to the special industry in

which he is engaged, and that it be made a condition of the grant to each man that one-third of the amount be retained until his report shall be supplied to the Society.

3rd. The Council think it will be undesirable to fix the exact time for, or to prescribe the duration of, these visits, or to interfere with any of the arrangements the men may desire to make for their own accommodation; but, in order that they may take advantage of the facilities provided by the Commission organised by the French Government for the study of the exhibition, the men will be placed in communication with that Commission on their arrival in Paris.

4th. A considerable sum will be required satisfactorily to accomplish the important object undertaken by the Society, and, in order to raise these funds, the Council have determined to appeal to the members of the Society, who must be interested in the successful results of this movement, in the belief that they will not hesitate to join in a subscription for the furtherance of the undertaking; and they propose at the same time to communicate with the various Chambers of Commerce, inviting their counsel and support. The Council have decided to commence the subscription by a vote of one hundred guineas from the funds of the Society.

The following report has been made by the Secretary:—

To the Council of the Society for the Encouragement of Arts, Manufactures, and Commerce.

Gentlemen,—In compliance with the directions of the Council, I proceeded to Paris for the purpose of ascertaining what arrangements were likely to be available with regard to the lodging and boarding of such artizans as might visit Paris under the auspices of the Society.

I soon found, from inquiries made in various quarters, that little information of any value, as to the probable cost of private lodgings generally, or as to what lodgings would probably be available, was likely to be obtained; indeed, any figures or statements under this head at that time were not likely to be of any use, or in any way to be a guide to the deliberations of the Committee.

The prices asked at that time were exceptionally high, but there was every reason to believe that a reaction would take place, and that, after the exhibition had been open a short time, these prices would diminish.

Mr. Cook, the well-known excursionist, I found was prepared to contract for the lodging and boarding of 50 artizans per week, supplying two substantial meat meals per diem, for 5s. per head per day. I subsequently placed myself in communication with M. Le Play, the General Commissioner of the Exhibition, who informed me that a Special Commission had been formed, under a ministerial decree, for effecting the very objects I was in search of, and he gave me a special letter of introduction to the Chairman of that Commission, Mons. Devinck, formerly President of the Tribunal of Commerce for the Department of the Seine, and I had two interviews with that gentleman. It appears that the object of this Commission is to raise, by subscription or otherwise, funds for facilitating the visits to the exhibition of foremen, workmen, or labourers connected with industrial and agricultural pursuits, and for enabling them to study the exhibition in all its aspects.

The Commission proposes to raise a fund (to which the Emperor and Empress have subscribed largely) in order to provide lodging and board at a cheap rate for artizans, to assist workpeople in their travelling to and from Paris, and to supply gratuitously medical aid in case of sickness. Mons. Devinck informed me that the Commission expected to have under their control five thousand beds. These are situated in different parts of Paris and the outskirts. They have had placed at their disposal large buildings and barracks, and some of a temporary character have been specially erected in the neighbourhood of the exhibition, which will be furnished suitably for the purpose, and beds will be arranged in the rooms, four and upwards in each room. In one of the buildings it is said that several hundred beds will be placed in one room.

Arrangements are made for breakfasts and dinners on a large scale and at a cheap rate, in a building erected for the purpose, with access to the Champ de Mars, where 1,000 persons can take refreshments at one time.

These arrangements, more especially those for aiding workmen gratuitously in their travelling expenses, were intended for French workmen, but at the same time all the organisation of the Commission is intended to be available for the workmen of other countries.

It is also intended that guides, speaking English and such other languages as may be necessary, shall be provided to conduct the men over such workshops as they may wish to visit. M. Devinck stated that on receiving notice a sufficient time beforehand, the Commission would be prepared to provide lodging for such men as might be sent over and recommended to their consideration by the Society of Arts, at a payment of one franc per night per head. Their breakfasts—a substantial meal of meat—and dinners would be obtainable in the building I have before named, at one franc per head for each meal.—I am, &c.,

P. Le Neve Foster, Secretary.

P.S.—Since writing the above, I have received the following tariff of prices at the restaurant referred to in my letter:—

Grand Restaurant Omnibus, Parc de l'Exposition (Avenue Lamotte-Piquet).

Prix des objets de consommation.

Pain	0fr.	10c.
Vin, le carafon	0	15
Bière, la chope	0	25
Bouillon	0	15
Potage	0	20
Bœuf	0	25
Légumes	0	20
Fromage	0	15
Café avec eau-de-vie	0	30
Roti *avec légumes*	0	40

On peut demander un seul des objets de consommation ci-dessus mentionnés.

Le consommateur, en apportant son pain, peut se procurer pour 0fr. 40c. l'*ordinaire* (bouillon et bœuf).

Members are invited to aid the Council in this undertaking by subscriptions, which should be forwarded to the Financial Officer at the Society's house.

The Council have received offers of co-operation from a Committee for promoting cheap excursions to the Exhibition, formed under the auspices of the "Working Men's Club and Institute Union," and of which Mr. A. H. Layard, M.P., is President, and Mr. Hodgson Pratt, Vice-President. This Committee has issued a notice to the effect that working-men may travel "to Paris and back, with one week's lodging," for 30s., or "with meat breakfast and superior bed accommodation," 44s. 6d. They estimate the total expense of stay (for one week), journey, and Exhibition ticket, at £3. Registration tickets, and every information relative to these excursions may be obtained from the Secretary, Mr. W. O. Pocklington, at 150, Strand, and at various Working Men's Clubs and Institutes.

Harvesting of Corn in Wet Weather.

The Council of the Society of Arts have resolved to offer the Gold Medal of the Society, and a Prize of Fifty Guineas, for the best Essay on the Harvesting of Corn in Wet Seasons.

The first part of such essay—after noticing the various systems at present adopted in damp climates for counteracting the effects of moisture upon cut corn in the field, and for avoiding such exposure in wet seasons by peculiar harvesting processes—should furnish a practical and analytic exposition of the best available means :—

1st. Whereby cut corn may be protected from rain in the field.
2nd. Whereby standing corn may, in wet seasons, be cut and carried, for drying by artificial process.
3rd. Whereby corn so harvested may be dried by means of ventilation, hot air, or other methods ; with suggestions for the storage both in the ear and after threshing.
4th. Whereby corn, sprouted, or otherwise injured, by wet, may be best treated for grinding or feeding purposes.

The whole to be supplemented by a statement of practical results, and actual cost of each system described ; and authenticated estimates of any process proposed for adoption, based upon existing but incomplete experiments.

The above requisitions are given suggestively ; not to bind the writer to the order or to limit the treatment of the subject, provided it be kept within the scope of practical experience and utility.

The essays must be sent in to the Secretary of the Society of Arts on or before the 1st of January, 1868.

The Council reserve the power to withhold the whole or part of the prize, in the event of no essay being, in the opinion of the judges, of sufficient merit.

Subscriptions.

The Lady-day subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Food Committee.

A meeting of the Sub-Committee on Milk was held on Friday, the 29th March. Present—Lord de L'Isle in the chair : Mr. Harry Chester, Mr. Caird, Mr. C. S. Read, M.P., Mr. Ludford White, and Mr. J. C. Morton.

Mr. W. Hope, in reply to questions by the sub-committee, said that he was connected with the Dairy Reform Company, the chief depôt of which is at the West-end of London, and the intention was to establish branches in as many districts of London as possible for the sale to the public of pure unadulterated milk. At present there was only a private partnership, but it was called by the name of the Dairy Reform Company, in the first place to indicate its objects, and in the next place with a view to give it more extension hereafter. At present arrangements were made for the daily supply of milk from about 300 cows, and the milk was brought to the establishment by road in the company's own vans, so that if possible there should be no tampering with it. They had already made arrangements for the sale of skim milk and a small quantity of new milk to the poor in Whitechapel. They had also a branch in Westminster, at which about twenty or thirty gallons of milk were sold per day. Upon the branch in Whitechapel being opened a dealer in that neighbourhood made an application to the company to make arrangements for the sale of the milk to him, instead of its being supplied through their own agent ; but on inquiry being made into his character it was found that he was a person who would not be likely to carry out the objects of the company with regard to the quality of milk they wished to supply, and the application was refused. It was ascertained that he immediately afterwards went to the agent and offered him £20 to retire, and a little time after subscriptions were made by the dealers in that locality amounting to £100, which was offered to the man to induce him to retire from the agency of that branch. The agent however withstood the temptations of these offers, and the business of retailing new milk was continued amid many oppositions and annoyances on the part of the dealers. Those who dealt at the company's shop were subjected to personal interruption by a number of rough people employed to molest them. This having been put a stop to by the police, the opposition had placed some persons with a can of milk opposite the shop, and engaged men to "tout" the milk as that which the company really supplied, and many people discovered the imposition by the quality of the milk they thus obtained. He might say there was the most determined and organised opposition to the introduction of pure milk by the company into that quarter of the metropolis. The opposition parties reduced the price to a penny per pint by the addition of a certain quantity of water, and the agent was subjected to numerous remonstrances as to the quality of the article by the parents of children who had been sent by them to get milk at the branch, but who had been induced to buy that supplied by the competing parties. One of the principal—he believed the largest milk dealer at the West-end, came to the company in a very friendly spirit, and, with many professions of desire to put a stop to the "tricks of the trade," made various offers to buy milk of the trade. Among other offers was one to take 12 to 15 barn gallons of skim milk per day, stating that he had a contract to supply a workhouse with that quantity of new milk, and that the price at which the contracts for these establishments were let precluded the possibility of new milk being supplied unless it was well watered. The company had been applied to for tenders for various places, but on ascertaining the prices usually paid they refused, as it was impossible to supply pure milk on such terms. The prices varied from 1s. 4d. to 1s. 6d. and 1s. 8d. per "barn" gallon delivered. He believed the dealers received 17 pints as the barn gallon from some farmers. The company sold 16 pints to the barn gallon, this being the quantity which they received. The per-centage of waste in retailing 16 pints of milk in the small quantities usually sold to the customers by the milk carriers depended very much upon the carefulness of the milk-carriers in serving it out. In the company's shop he did not think the waste would be more than a quarter or half per cent. Most dealers did not profess to sell skim-milk, but they were ready to buy any quantity of it. The company had sold skim-milk at 1s. per barn gallon, or 1½d. per quart. As far as he had been able to ascertain, no new milk was sold in London except that which was supplied for the use of infants and invalids. He believed some dealers, if they got a good contract, did supply genuine milk, but the price they got would be equal to about 5d. per quart. The price of milk at the West-end at the present time had been reduced since the company supplied milk at 4d. per quart. As he passed a dairy in Brook-street that day, he saw the prices put up—New milk, 4d. ;

skim-milk, 2d.; and cream 4s. per quart. With regard to the quality of milk sold generally in London, he took the existing evidence on that subject, chiefly that of Dr. Letheby and the statistics Mr. Morton had given, showing that the milk supply of London was derived from about 30,000 cows. Dr. Letheby stated, in his report to the Corporation of the City of London in 1854, that the addition of water to the milk amounted to about 30 or 40 per cent., and so if an Act were passed, rendering the use of water for the reduction of the quality of milk practically impossible, an increase of 50 per cent. in the number of cows from which the supply of milk to London was derived would be necessary to keep up the existing supply. Before the company's shop was opened they sold a large quantity of milk—about 70 barn-gallons per day, to a dealer at the East End. He bought it on the farm, and brought it away at his own expense, and he made his living out of it, although he stated he had a contract for a workhouse at 1s. 6d. per gallon, or 2d. less than he paid for it. The company made a tender for the supply of the Brompton Hospital at 1s. 3d. per imperial gallon, the milk being guaranteed to contain 12 per cent. of cream. That would be about 3¾d. per quart. Milk varied very much in quality, even when not tampered with. Cows which had recently calved yielded richer milk than those which had calved five or six months; the milk of a young, vigorous cow was richer than that of an old animal. The best cows would yield considerably more than a pailful of milk at each milking, a pailful being about eight quarts. It was difficult to state what would be the percentage of cream from a bulk of milk taken from a number of cows of different ages and condition of circumstances, and it could only be done by a knowledge of the general average quality of the milk so mixed together, but the company had offered to guarantee 12 per cent. of cream in the milk they supplied. He could not say what was the average percentage of cream contained in London milk. It varied in different districts. The company had sent large quantities of skim milk to a charity in Soho-square, which was distributed to the poor gratuitously, and he had been assured that the skim-milk so sent was better than what the dealers charged 5d. per quart for. The quality of the milk of course depended very much upon the food of the animals. The company's supply was derived from a large dairy-farm near Barking. The cows there were fed on mangel-wurzel, hay, and grains. Some barley-meal was given to the cows which were heavy in milk, and those which were shrinking in milk were fattening. Mr. Hope further stated that dairy farmers could supply the dealers with milk wholesale at 2d. per quart delivered in London, but he thought there was very little delivered quite genuine at the stations. Many of the farmers no doubt adulterated their milk to a certain extent before they sent it away. He should say a large proportion of it was adulterated.

Mr. Caird remarked that where neither of these practices was resorted to, there was no produce which yielded so large a profit to the farmer as milk at 2d. per quart. He would, therefore, like to know how it was the company could not supply milk at less than double that price?

Mr. Hope replied that the company paid 20d. instead of 16d. per gallon; that was the price paid to the Barking Farm Company. The carriage cost about 2½d. per barn gallon delivered at the depôt.

Mr. Ludford White asked what profit Mr. Hope thought the retailer ought to have per gallon to pay him for his trouble.

Mr. Hope thought that a small dealer required a margin of profit of 1s. per barn gallon, or 6d. per imperial gallon, to pay for the transit from the station and the delivery in town, to cover waste, wear and tear, and wages. The quantity of milk taken by each customer was small, and the labour of retailing it was great. The experience of the company had as yet been short, but as far as it went he should say that no milk-carrier on foot could retail more than 80 quarts in the two deliveries per day. That depended, of course, upon the number of separate deliveries and the distance between the customers. Sixty quarts per day, he thought, would be as much as some carriers could deliver on an average.

Mr. Caird remarked that the question was whether, if milk could be produced to yield a good profit to the farmer at 2d. per quart, it could not be sold by the dealers at less than double that price, and give a fair margin of profit to them?

Mr. Hope said the whole question turned upon the purity of the article supplied. He thought the reason why there was not a greater demand for milk in London was because people felt that they could not get it genuine, and therefore used as little of it as possible; and though the dealers got it at prices from 1s. 2d. to 1s. 4d. and 1s. 6d. per gallon, until lately they had been charging 5d. per quart for what they called new milk.

Mr. Chester inquired what security the company had that the milk they sold to dealers, and that which was distributed by their own carriers, was not tampered with before it got to the consumers?

Mr. Hope said of course, in the case of dealers, the action of the company ceased upon the delivery of the genuine milk to them; but in the case of their own carriers the cans were sealed at the top before they were sent out, and if the customers saw the milk drawn by the man they could ensure having the genuine article at their own doors. Adulteration by water could be detected by the lactometer.

The Chairman suggested that cream, from its much greater price, offered greater temptation to adulteration than milk.

Mr. Hope replied, that the dealers "protected" themselves in another way, namely, by the measure given. When the company was organised he went to the person who made the small delivery cans for the principal dealers in London, to order some dozens of cans; and in speaking of those which were wanted for cream he asked "Do you want them 'full?'" which he found meant whether he required them to be of full measurement. He then learnt it was the "custom of the trade" to have cans for cream which held twenty-five per cent. less than the proper measure. A large West-end dealer offered to purchase the cream of the company at 2s. 6d. per quart, which he sold at 5s. and 6s. per quart. In course of conversation he (Mr. Hope) asked him if he gave the full measure in cream; to which he replied, "Oh, yes; that is to say we give full 'cream' measure," and implied that was as much understood by the public in the article of cream as the wine-merchant's six bottles to the gallon of wine. A small measure was thus adopted for the more valuable commodity of cream. It was, no doubt, a more difficult operation to adulterate cream than milk, but he believed the dealers more generally "protected" themselves by the short measure. The public got a genuine article, but 25 per cent. short of the measure. The dealers bought the cream full measure, by the imperial quart or gallon. When asked why he preferred to pay 20d. per gallon for the milk from this farm instead of 1s. 4d. for that delivered at the railway stations, the reply of one dealer was, "There is a great deal more 'room' in it;" which led him to infer that the farmers sent out their milk adulterated to a certain extent. He had seen a great deal of tampering with milk at the railway stations on the part of porters. He had seen them tipping the cans over and filling jugs from them.

Mr. Read suggested that it was the practice of some dairy farmers to give food to cows with a view to the quantity rather than the quality of the milk they produced.

Mr. Hope hardly thought that course would be adopted by an intelligent farmer. Milch cows required the best food to keep them in constant milk. Grains tended to

increase the quantity of milk but did not improve the quality of it, and required a corrective.

Mr. Chester asked if it was part of the plan of the company alluded to to open branches in other parts of London?

Mr. Hope replied that they hoped to do so eventually in every part of London if possible, and he had no doubt 1s. 4d. per gallon would be the price at which the Farm Company would be able to sell their milk. He believed the company or their tenants would make an ample profit at that price, and he had no doubt, as the expenses of the milk company were diminished, and as their business increased, they would be able to reduce their margin of profit from $1\frac{1}{2}$d. to $\frac{3}{4}$d. or $\frac{1}{2}$d. per quart. Mr. Hope then proceeded to explain the plan which had been adapted by the company for collecting the cream from the surplus milk, and also their experience in making butter from the new milk on their own premises. As far as the experiment had gone at present, using the atmospheric churn, the yield of butter had been as much as an average of $1\frac{3}{17}$ths of a pound of butter from two imperial gallons of milk. That was no doubt in excess of the yield of ordinary new milk. There was some difficulty in the use of the atmospheric churn, from the extreme nicety to which it was necessary to regulate the temperature of the churn. The best yield of butter was at 68°. If it were raised above that, such butter as was produced was of a lardy appearance and of a colour which made it unsaleable, and the quality was not good. There was sometimes difficulty in getting the precise temperature required. The residue under the operation of the atmospheric churn was nothing but pure skim milk, perfectly sweet. It was not what is usually termed buttermilk. The butter, when produced in sufficiently large quantities, was sold in Newgate-market at 1s. 6d. per lb.; and none but very freshly made butter was sold in the company's shop at 22d. per lb. at the present time. He had not found that any prejudicial effect was produced on the milk by the carriage from the farm to the establishment in London so far as its churning qualities were concerned. As the result of some consideration of the subject, and looking to the natural laws by which the process of the rising of the cream upon the surface of the milk was governed, he had tried the experiment of "setting" the milk in deep and narrow metallic cylinders, instead of the ordinary method of doing so in wide and shallow vessels. The result was that in the long and narrow cylinders the cream rose more quickly than was the case in the shallow vessels, and, forming a compact mass at the top, it could be dipped out with much less labour and in much less time than was required to skim the same quantity of cream off the surface of the shallow vessels, and there was a less quantity of surface cream left upon the milk. Where there was a large quantity of milk to be "raised," and when the shallow vessels were used for the purpose, it occupied two women the whole of the day in skimming off the cream, whereas by the use of the deep cylinders the cream was removed by dipping out the mass which formed to a considerable depth at the top of the cylinder. The results of the latter method of raising the cream were tested in the first instance in a glass tube about 16 inches high and two inches diameter. This tube was filled with new milk in order to see whether his assumptions were based on fact. The milk was placed in the tube at half-past nine o'clock in the morning, and at five minutes past 11 nearly the whole of the cream had risen. His partner, who was at first sceptical on the point, afterwards admitted that the theory was proved to be correct. That plan he believed would in future be acted upon in the establishment, and his endeavour would be directed to obtaining large glass cylinders, five or six feet in height and nine inches diameter, in which to raise the cream in the manner he had described. By the use of glass cylinders the line of demarcation between the two liquids could be exactly ascertained, and the removal of the cream be conducted accordingly. The wasting surface of cream by this method was nothing in comparison to that which would exist in the nine or ten shallow dishes that would be required for raising the same quantity of milk as was contained in a cylinder of the dimensions he proposed to adopt. Temperature had much to do with the rapid rising or otherwise of the cream. The company had painful experience of that during the recent very severe weather. The cream would not rise, and the milk had to be sold, or rather given away, to the company's loss.

Mr. Caird mentioned that when travelling in Sweden in the summer time, he was much struck by the practice which was adopted by a large and thoroughly experienced dairy farmer, of placing the vessels containing the milk from which the cream was to be raised, in water cooled by pieces of ice being placed in them. The reason given for this was that it caused the more rapid rising of the cream; that was a plan adopted by a man of great intelligence and practice; and, therefore, he concluded it was based on sound conclusions, although differing from his preconceived ideas on the subject.

Mr. Hope suggested that the satisfactory results mentioned by Mr. Caird might have ensued from the depth of the vessels in which the milk was contained, rather than the icing of the water in which they stood.

Mr. Caird said it was not so, because careful experiments were made without the ice, and the results were not so satisfactory. It was found that the ice had the effect of hastening the separation of the cream. This practice was adopted in a dairy of 300 cows. The little wells of water in which the vessels were placed were a very simple affair, and the whole thing did not involve any great expenditure of money.

[The French milk can which had been sent to the Committee from Paddington Station having been exhibited to Mr. Hope, that gentleman expressed his unqualified approbation of it, both as regards its handy size and the material of which it was constructed, as also the mode in which the top was fitted in, so as to prevent the agitation of the milk in travelling by railway or other conveyance.]

Mr. Brooks, an officer of the London and North-Western Railway Company, having been introduced to the sub-committee,

The Secretary read a return of the gross quantity of milk carried on the above railway, which had been furnished from that company, as follows:—

	No. of gallons.
1. Milk brought to the Euston-square terminus in the year ending December, 1865.	490,320
Ditto in year ending December, 1866 ..	1,209,284

2. The stations from which the milk arrives at the Euston terminus are the following, viz., Aylesbury, Bletchley, Cheddington, Claydon, Crick, Dunstable, Leighton, Marston Gate, Newport Pagnell, Northampton, Rugby, Swanbourne, Tring, Ullesthorpe, Winslow, and Wolverton. N.B.—The quantities received from each station cannot be arrived at with any degree of accuracy, from the mode of keeping the accounts not being framed with such an object in view.

3. The company run one special train with milk from the country daily, and return the empty cans in like manner.

4. The milk is conveyed [in cans provided by the senders] on open carriage trucks, and no special mode of stowage is resorted to.

Mr. Brooks said, in reference to the figures just read, there was a considerable falling off in the quantity of milk carried since the period embraced in this return. He had taken out the last week's cash receipts for carriage of milk, and he found they were only £83, or equal to about £4,300 a-year, as compared with the corresponding period in 1866, when it was £229, or equal to about £12,000 a-year. He accounted for this decrease by stating that the London milk trade was regaining its normal con-

dition previous to the cattle disease breaking out. The same rates were charged this year as last. The charge for a distance not exceeding 100 miles was 1½d. per gallon, and exceeding 100 miles 2d. per gallon (imperial). When the great increase in the traffic commenced, milk was sent up from places 180 and 200 miles distant—from Huddersfield, Macclesfield, &c. The greatest distance from which milk was sent now was about 95 miles. The largest quantity of butter sent from any place on the London and North-Western line was from Aylesbury, but that did not come under his attention, as the carriage of that article was by goods trains. He did not think any material improvement could be made in the carriages which were used for the conveyance of the milk, carriage trucks being now used for that purpose. Those now used were about as well constructed in respect of the springs as they could be, and it was desirable that the milk should be as little shaken on the journey as possible. He thought the size and form of the French milk can much better than that in use in this country. He considered it an advantage that the milk should be fixed as solidly as possible in the cans, but he had heard no complaints as to the condition of the milk being deteriorated by the journey on the railway, although he thought it might be somewhat affected in hot weather; but that, he believed, depended a good deal on the quality of the milk and the distance travelled.

Mr. Morton (being appealed to on this point) said the London-produced milk sold at a higher price than that which was sent from the country, the highest price paid by the dealers being for the milk which they themselves milked.

Mr. Brooks said the French can was much more convenient to handle at the station. It was a stipulation with the dealers that their men should assist the porters in unloading the cans, because the cans were too heavy to be handled by one person. The weight of a can filled with milk would be near upon 200 lbs. The trade came to be of such an extent as to lead to the putting on of special trains for the purpose. They were timed as passenger trains, and passengers could travel by them if they pleased. The milk was brought to the various stations in time for the arrival of the milk trains. One train arrived in London at a quarter to twelve in the forenoon: that was for the afternoon supply; and the second train arrived about half-past eight in the evening: that was for the next morning's supply. The reason for putting on the special milk train was owing to the impediment to the ordinary passenger trains caused by stopping at the stations to take up the milk. With regard to improvements in the method of carrying milk and cream long distances, Mr. Brooks mentioned that, during the time of the greatest scarcity of milk, an arrangement was made for bringing cream from a distance as remote as Carlisle, and that was done by the article being placed in small cans—much smaller than the French milk can—and carried suspended in the truck; but, when it arrived in London, it was found that the cream was reduced almost to the consistency of milk. That trade was therefore abandoned. He believed in that case the vessels were filled as full as possible, to prevent the shaking of the cream. In the long journey of 300 miles the cream was converted—by some means he could not account for—into the consistency of milk. It arrived in London quite sweet, but could not be used as cream. There was at the present time a considerably larger quantity of milk sent up by the railway than was the case previously to the cattle plague, and he thought it likely that the present quantity would be continued for some time. The quantity began to fall off in March and April last year, from 161,000 gallons in March, to 142,000 gallons in April, and from 125,000 gallons in May, to 95,000 galls. in June; in July to 80,000 galls., in August to 64,000 galls., in September to 53,000 galls., in October to 63,000 galls., in November it fell again to 59,000, and in December it rose to 66,000 galls. The quantities for the corresponding months in 1865 were—July, 6,288 galls.; August, 17,400 galls.; September, 61,888 galls.; October, 95,484 galls.; November, 116,760 galls.; and December, 148,296 galls. Thus it would be seen that the marked increase in the milk trade on this line commenced in the month of August, 1865.

Mr. Caird remarked that was the month in which the disease first broke out in the herds of Lord Granville and Miss Coutts.

Mr. Brooks, in reply to other questions, stated that no other means were taken by the railway company to develop the milk trade than the putting on of more trucks and eventually establishing special trains for it. The rate charged was increased as soon as the special trains were put on, and that had not had the effect of diminishing the quantity. The rates were increased from a penny per gallon under 100 miles to a penny half penny, and that rule was still continued for that distance. The trade at present amounted to about 54,000 gallons per month. Those parties who made complaint about the increase in the rates could not have calculated at what price per ton the company carried the milk, or they would have found that the milk, including the weight of the cans, was carried up to a distance of 100 miles for 1s. per cwt. When the milk train arrived the dealers assisted in the unloading of the vans, and the milk was carried away in the dealers' own conveyances. He was not aware of any other means by which the milk could be more promptly or more rapidly distributed than it was under the present system. When the large business in milk was commenced the dealers wanted something of a market place, but there was not space enough at the station for that; they then adjourned to some of the adjoining streets, but that was stopped by the police authorities. As far as the railway authorities were concerned, he imagined it made no difference to them whether the smaller sized can were used or the present large size, inasmuch as the same quantity would have to be carried, whether it were done in large or small cans. Undoubtedly the French can was more conveniently handled, and a man of ordinary strength could load and unload one of these cans without help. He apprehended if the small cans were adopted, waggons with two tiers, something in the form of the sheep vans, would answer the purpose, as it was not desirable to place the load too high, but, if special vehicles were constructed, they must be reserved for the milk traffic alone, and would not, like the carriage trucks now in use, be available for other purposes. There had been cases in which cans of milk had been stolen from the station by the milk dealers; and he knew of one instance in which the offence was condoned by a public apology and the payment of a sum of money to the poor-box of the police-court.

Nineteenth Ordinary Meeting.

Wednesday, April 24th, 1867; C. W. Siemens, Esq., F.R.S., in the Chair.

The following candidates were proposed for election as members of the Society:—

Ainslie, Montague, Grizedale, Hawkshead, Windermere.
Amhurst, W. Amhurst T., Didlington-hall, Brandon, Norfolk.
Essell, George, The Precincts, Rochester.
Fisher, Thomas, 24, Hanway-street, W.
Hutton, Thomas Winder, 5 and 6, Newgate-street, E.C.
Maddick, Alfred, 40, Clarges-street, Piccadilly, W.
Rylands, Peter, Bewsey-house, Warrington.
Sayer, Commander George, R.N., Statenborough-house, Sandwich.
Tinne, John A., F.R.G.S., Briarley, Aigburth, near Liverpool.

Toler, Hon. Ottway Fortisque, 6, Albemarle-street, W.
Weld-Blundell, T., Ince-Blundell-hall, Great Crosby, Liverpool.

The following candidates were balloted for, and duly elected members of the Society :—

Brown, Thomas P., 24, Surrey-street, Strand, W.C.
Despointes, F., 11, St. Luke's-road, Westbourne-park, W.
Jones, Sir Willoughby, Bart., Cranmer-hall, Fakenham.
Roe, Charles Wm., Padmore-villa, Sunny-bank, South Norwood, S., and 37, Moorgate-street, E.C.

The Paper read was—

ON THE CONSTRUCTION OF IRON SHIPS, AND THEIR PRESERVATION FROM CORROSION AND FOULING BY ZINC SHEATHING.

By S. J. Mackie, Esq.

In view of the magnificent total of British iron ships, I need not apologise for taking a survey of the state in which they are kept, and the manner in which they are built, in order to show that they are neither built nor kept as they ought to be, if I can succeed in proving that iron ships might be better built and better kept than ever they have been. Still more shall I be justified in calling attention to these subjects if I can further show that the present depression in the iron ship-building trade may undoubtedly be released, and double the amount of tonnage of ships annually constructed hopefully expected for the future of the iron ship builders.

For my own part, I am the more free to speak boldly and unreservedly, in that I am not about to advocate any plan of my own for the remedy of the evils that exist. To my mind there is but one right way of doing everything that has to be done. Men did not build ships when they first began to navigate the seas, but scooped out into canoes the trunks of trees, such as had served them for sitting astride to cross the rivers in their way. Nor did they, when wanting vessels of burthen to carry interchangeable commodities for longer distances, build wooden vessels as large as the East Indiaman of the last century, or as swift as the American clipper of this. So iron ship-building, although a modern invention, did not start into existence in perfection, but has gone through various modifications and improvements, until it arrived at its present eminent condition. Progress has still to be made. Far be it from me, however, to deny, or to attempt to diminish the ability and the perseverance of the eminent engineers and practical thinkers who have foreseen and avoided so many difficulties, and have encountered and conquered so many more, nor to undervalue the experience and skill of constructors and skilful workmen. Nor can it be my wish in any way to detract from the deservedly high fame which the English and Scotch iron ship building yards have so far maintained. But there may be a time in the history of iron ship building, as there has been in most other great branches of manufacture and commerce, when those who have got a long way towards perfection become enamoured of what they have done, and think nothing better to be possible. Such is, to a regretable degree, the present condition of iron ship builders. Having done a great deal, there is no disposition to go a step further, although it be but one step further that is required, to make modern ship-building as perfect as, in the present condition of science, is possible. The corrosion and fouling of ships may be said to be no business of the ship-builder ; and most men engaged in the trade might possibly admit that cleaning, repairing, docking, and tinkering constitute a very large proportion of the ship-builder's business. But herein lies a serious error. Shipowners and merchants are undoubtedly more closely concerned in the preservation of the ship, and in her cleanliness and speed at sea ; but if the capacity of keeping a clean hull would create an additional demand for iron ships, is not the means of effectually preventing the fouling of an iron hull in salt water well worthy the attention of the iron shipbuilder ?

Such a means exists, and has been proved undeniably by experiments, and yet there is no disposition to give it practical adoption ; a fearful evil exists in the unmechanical butt-joint, and yet iron shipbuilders go on planing, and caulking, and fitting at enormous cost, and boast of the beautiful work that sends every iron ship afloat to sea, with the most effectual device for her destruction which the highest scientific knowledge and the most practical ingenuity could conceive. If our commercial shipbuilders will not take the lead, we cannot wonder that the artificers in our naval dockyards are still permitted to pride themselves on the fallacious finish of their butt-joints ; and while shipowners spend thousands of pounds in docking and cleaning their ships, allow corrosion and decay to have unlimited rule, and besmear the hulls of vessels worth tens of thousands of pounds with red lead, phosphorus, arsenic, and other ineffectual poisons, we cannot express much surprise that to the complaints of naval officers of the fouling and corrosion of their ships, the incasing of our gigantic iron-clads in outer wooden copper-sheathed skins should be the expensive relief afforded by the Admiralty, and that Hay's composition and other so-called anticorrosive and antifouling paints should be in official favour.

There is but one way of effectually preserving iron ships, which is by sheathing them with zinc in the same way as formerly wooden vessels were sheathed with copper, and as the plan proposed for attaching the zinc plates to the hull has elicited a perfect means of getting rid of the insecure butt-joints in the construction of the vessel, as well as rendering it easy to make the skin of the ship flush and fair from top to bottom, and end to end. I have for these reasons proposed to consider the practical construction of iron ships in connection with the main object of this paper, namely, the prevention of the iron hull from corrosion and fouling, by an external sheathing of zinc plates.

No one of even the slightest experience of iron ships can fail to be aware of the extent of the corrosion and fouling to which they are liable. But of what takes place ordinarily, no notice finds its way into the columns of the newspapers ; and it is only of exceptional cases, where size makes the particular vessel remarkable, such as in the case of the *Great Eastern*, or where the matter commands attention on account of its national importance, as in the case of some of our formidable iron-clads, that any reports come before the general public. The matters of corrosion and fouling are not, however, the less serious that they are permitted to proceed unhindered and on a most gigantic scale in silence.

We have first to do with corrosion. The corrosion to which iron ships are subjected is the oxydation of the metal. Wooden ships were liable to perforation by sea-worms, and to fouling by sea-weeds and barnacles. After a time it was found that copper attached to a wooden ship's bottom would keep perfectly bright and clean. The use of copper sheathing was first adopted by the Admiralty in 1761, under the prevailing idea that its poisonous influence would be obnoxious to marine vegetation and life, and when H.M.S. *Alarm* was found clean after a four years' voyage, the success was attributed solely to its poisonous character. The reign of copper at the Admiralty has lasted from that date to the present hour. But copper dare not be put on an iron hull. What was bad before in the extent of the corrosion becomes infinitely worse under the influence of the galvanic action set up by the contact of these two metals.

In the early days of the sheathing of wooden ships it was found that iron bolts in the timbers, and other objects of that metal in contact with the copper, were eaten away incredibly quickly ; and in various accidental ways injuries of a like and very serious nature have repeatedly happened from the contact of copper with the

hulls of iron ships. Indeed, it is admitted upon all hands that copper sheathing cannot be applied to iron ships, and that if it were, the total destruction of the hull would be accomplished at the most rapid rate; nevertheless, as copper prevented the fouling of wooden ships, there has been from the commencement of the era of iron ship-building a too general and very fallacious hankering for some method of covering iron ships with copper. Various compositions of india-rubber, felt, and other insulating materials have been interposed, in various cases, between the copper and the iron skins of certain vessels; and even at this moment under the persistent tradition of the *Alarm*, or the commercial influence of Muntz's metal in official quarters, the Admiralty are having some of our huge and costly iron-clads entirely coated below the water-line with a jacket of timber several inches in thickness, in order to insulate that copper sheathing which the wise men of a century since very properly adopted for the preservation of the ships of their day, but which it is surely inexcusable for the men in high places now to put at a dangerous risk upon the hulls of the most costly vessels ever sent upon the seas, when another and cheaper metal, bearing exactly similar relations to the iron which copper did to the wood, could be more simply and more easily applied. It is not possible to ensure the insulation of the copper sheathing from the iron hull of a vessel afloat. Even admitting that the insulation can be perfected when the ship is sent out of dock, the many casualties she is subjected to on her voyage are constantly tending to injure and destroy the insulation. Grazes and rubbings against piers and quays are always liable to make holes in and to strip off portions of the sheathing, whilst plates of the covering metal may be peeled in various ways upon the open sea, and, once contact permitted, nature will not be slow in putting galvanic currents destructively in action. Even when an iron ship is actually encased in double planking, the shrinkage of the wood or the opening of the joints by strains of the vessel's motion by permitting the percolation of sea-water will give a connection between the two dissimilar metals of the hull and the sheathing, and the iron of the armour and skin will yield not the less quickly, not the less certainly, not the less dangerously, that it is hidden from the eye-sight, or be the less expensive or difficult to repair, that several inches thick of timber have to be removed from the exterior of the ship before the extent of the injuries can be ascertained. One example of the effect of copper on an iron ship is as sufficient for practical illustration as a thousand, if there be a thousand similar facts existent to back it up; and if facts upon this point be desired there would be no risk in engaging to produce a volume. We take one of three years since, that comes readiest to hand. It is from *The Hereford Times*, of 14th November, 1863. Truth is often spoken of as deep in a well, and rare fragments of honest truth are often to be culled from provincial newspapers:—

"Here is the last little piece of news from the iron squadron:—As lately as May in the present year there lay at her moorings off Folly Point, in the Medway, the youngest of these Titans—the *Royal Oak*. Of enormous tonnage, giant proportions, and hull that seemed to make the tired ocean groan under her, she was pointed out with pride by yachtsmen and passengers as a bran-new 'bulwark of England.' Towards the close of May she got under weigh a maiden ship, 'ataunto,' 'spick and span,' as handsome as paint and varnish could make her, to join the Channel fleet in its cruise round England. She turned out a capital sea-boat; she showed her heels to the best of the squadron before the wind; and more than once had to lower her topsails to let the laggards in her wake overhaul her. She was 'another success,' and the Admiralty were as proud of her as the people. Now she comes into port, and what do we hear? That smooth and burnished bottom, coated with 'Muntz's metal'—thanks to which she made such fine sailing—has put her *hors de combat* far sooner than fighting could have done. This ship—this Admiralty pet—which has been just four months in commission, is as rotten already as a collier after forty seasons. They have got her into dock, and they find that all along the line between her sheathing and her lower plating, the great and costly iron slabs have perished into something like plumbago. There are holes three-quarters of an inch deep, in just that very part of her armour which protects the 'wind and water line.' Where the hooks of the side-ladder have helped the sea-water and the sheathing to do their work, the iron is gone in a deep furrow, and from all the joints of the submerged plates there oozes a black slimy liquor, which is doubtless chloride of iron, and which means that plate and rivet and backing are rotting altogether, inside and out of sight. Into some of the four-and-a half inch plates, which were to guard this bran-new vessel, you may poke a pen-knife blade half way to the handle, in spite of an ingenious band of some sort of metal, not intelligible to those who made the discovery we are describing, the effect of which was to obviate galvanic action. In a word, as we have said, the maiden monster has come into dock rotten from her first trip."

This is the account of the effects of copper sheathing three years ago, and yet during the present spring the costly *Northumberland* has sailed from Chatham for Devonport to be covered with the same destructive metal, and the huge ship, whose launch was so ruinous a labour, may come perhaps, after a brief life of rapid consumption, to an inglorious if not cataclysmal end. How, it will be properly asked, is it proposed to overcome this evil. The corrosion of iron ships may be effectively stayed by the use of zinc sheathing. The zinc sheathing may be put direct upon the iron skin, and the iron will not only not be injured, but it will be preserved. The idea which has been practically worked out by Mr. Daft, in his well-considered plan of zinc sheathing is this:—If the galvanic action set up in the cell formed by the iron ship and the covering of sheet copper—or Muntz's metal, which is a compound of copper—be destructive of the iron of the vessel, then to use, as a means of preservation, that metal to which iron will stand in the voltaic circuit, as the copper in the former case did to the iron. In other words, if the ship and her sheathing form a voltaic battery, the elements of which stand in such electro-chemical relation to each other that the ship shall be destroyed, then to find out the way to reverse the conditions of that battery, so that the ship shall be preserved. This is done by the substitution of the element zinc for the element copper.

That we may not appear to be pinning our faith quite upon Mr. Daft's intellectual sleeve, we will quote a few passages from Mr. Lamport's paper, "On Wood and Iron Ships," in Vol. IV. of the Transactions of the Institute of Naval Architects. He proceeds thus:—

"First.—When chemical decomposition is produced upon two metals in contact, the more oxidizable one becomes electro-positive, and the less oxidizable one electro-negative. The various metals in common use may be arranged in a series, in which those first in order become positive by contact with all those that follow, and negative with those that precede—as zinc, iron, lead, tin, copper, silver, gold, platinum.

"Secondly.—When any two of the above metals are combined in a fluid capable of acting upon one of them by chemical decomposition, a galvanic current is produced, passing from the more to the less positive metal, which then becomes negative. The energy of the current is in proportion to the vitality of the chemical action, which is confined to the metal which is most electro-positive. The other, becoming negative, is *protected* from the chemical action. For example, if iron and copper be combined in an acid or in sea water, iron, being more electro-positive than copper, is chemically decomposed, or, to use a more common phrase, is 'corroded.' The galvanic current, passing from the iron or

generating metal to the copper as the receiving metal, changes the condition of the latter from a naturally electro-positive condition to one relatively negative. The metal, thus rendered electro-negative by the galvanic current, becomes proof against the action of the fluid as a chemical agent. No decomposition takes place, and it assumes the condition of a 'protected' metal, while the more positive one is still more rapidly eaten into and decomposed by the stimulated chemical action. If in place of copper and iron we take iron and zinc, the same process takes place, *reversed*, however, as regards the iron. Zinc, being more positive, is chemically decomposed, and the current passing to the iron renders it negative, and, consequently, insoluble or 'protected.' It will, therefore, be observed that it is the chemical action that is deleterious, and that the ensuing galvanic current, by changing the natural condition of the least positive of the metals to that of a negative receiver, protects it from the chemical decomposition to which alone it would have been subjected. Further, the union of three or more metals produces similar results—as with copper, iron, and zinc. The corrosion takes place in the most electro-positive, zinc, to the protection of the other two.

"Thirdly.—To produce these phenomena actual contact is not necessary, as the fluid itself becomes a medium of combination.

"Fourthly.—The relative size of the positive and negative metals has no influence upon the direction of the current, which passes always from the most electro-positive metal to the other, irrespective of surface or mass. A small piece of metal, therefore, may absolutely protect a far larger mass of one rendered electro-negative. A considerable preservative effect has been observed when the surface of zinc has been to that of copper as 1 to 1,000."

The relationship of zinc to iron in a galvanic cell is undoubted: indeed it may be and was proved by the first voltaic battery recorded, namely, that formed by simply placing two plates of the metals, with their lower edges touching like a V, in a glass of salt and water, or diluted sulphuric acid. This experiment may be performed by any one with pieces of zinc and iron and copper and iron respectively coupled in two ordinary tumblers filled with salt and water. The solution in the one will be colourless, that in the other quickly stained of a deep blood-red hue with the oxide of iron, which will be also deposited in quantity at the bottom of the glass in the condition of ochre. The iron in the other cell will keep for weeks and months perfectly unattacked, whilst the zinc in connection with it will remain bright and clean, from gradually and continually losing a small portion of its volume, a very slight quantity of the white oxide of zinc being deposited in the tumbler.

Zinc sheathing applied to wooden vessels does not answer; for when zinc is isolated on wood it becomes its own protector. The zinc oxidizes and the hard oxide which results soon covers the surface, and exfoliates so slowly, and irregularly, that fouling takes place to a considerable extent. Copper, on the contrary, when thus isolated on wood, suffers sufficient chemical degradation to present a constantly clean surface. What the zinc requires to compete with the copper for brightness and cleanliness is a little stimulus; and this accelerated action is effectively provided for by the galvanic current set up by its contact with iron. Thus the one thing needed to make zinc sheathing a success is involved in that desideratum so long necessary for iron ships—the prevention of their corrosion and fouling by the direct application of a metal sheathing. If the expensive sheathing with copper be so repeatedly and persistently attempted, the greater cheapness of zinc cannot be any valid objection to that metal—and this corrosion and fouling can be prevented by zinc sheathing, and that, too, with the additional vital advantage that it will at the same time insure the most perfect preservation of the ship. We have in zinc exactly what is required—a metal that may be put direct, without any insulating material whatever, upon the bare surface of the iron skin of the ship—that when so placed will form a voltaic cell, the electro-chemical action of which will preserve the iron, while the zinc will only sufficiently and regularly degrade and exfoliate to maintain a clean surface in any waters, at the same time that it is capable of enduring for four of five years without removal.

I come now to the second point—fouling. This, like corrosion, or dangerous defects of construction, is not the less serious and expensive that it is kept out of the arena of general discussion. It is not to the advantage of shipowners to make any fuss about what they know not how to prevent, or to mention any scheme which has any probability of doing that which they think will seriously diminish, if not entirely ruin their business. The fouling of government ships, too, not only involves loss of speed, but more steam-fuel, more food and provisions, longer pay for the crews, and expensive docking and repairs, necessitating the labours of hundreds of men, often for considerable periods of time. I myself saw, a few months since, at one of our principal naval yards, employed for the best part of a day upon one of our large iron-clads, in bringing her into dock and shoring her in position, upwards of 300 men. But as nobody but the public has to pay the expenses of fouling, and bringing grist as it does to the official mill, it is not at all likely to receive correction so long as that bountiful paymaster—the nation—takes no heed whatever of the matter.

That the fouling of iron ships is a most serious detriment and a continual exorbitant expense, the very fact that copper sheathing is so persistently attempted, in spite of all obstacles and dangers, is collateral evidence of the very strongest kind; and, indeed, no shipowner or captain of any experience, if put to the test of his veracity, could deny it, however unwilling he might be, from what he probably, but very erroneously, would consider prudential motives, to admit the truth of the assertion. On this point, however, as on others, I intend to take evidence, and from the abundance of witnesses I will now select to bring Mr. Lamport into court. In Vol. IX. of the "Transactions of Naval Architects" he admits that the cost of copper is not the reason why iron ships are not sheathed with that metal. At page 289 he says:—

"The next section takes in the doubtful qualities of iron, and the first is that of superior economy of maintenance and reparation. I admit that iron ships do not incur the periodical cost of coppering. But why? Certainly not because the outlay is not needed, but because owners are compelled to forego its admitted advantages. Chemical action forbids the contact of copper or yellow metal sheathing with iron; but I put it to any owner of an iron ship whether he would not willingly pay the cost of coppering to avoid the drawbacks of fouling. If so, can the constrained saving be considered in the light of a gain? Its result is a foul bottom and a lengthened and uncertain voyage; and, as time is money, such saving is anything but economy. But is there no counterbalancing outlay from scraping, painting, or otherwise coating iron ships' bottoms, and is there no loss of material from oxidation of the iron itself to set against the caulking and coppering of wooden ships?

"By Lloyd's rules, the thickness of the plates for twelve years' iron ships is $\frac{1}{8}$-inch more than those of the six years' grade. The experience of the committee, therefore, points to $\frac{1}{8}$-inch as the waste due to six years' wear and tear. In six years, a twelve years' vessel will be liable to be reduced, we may suppose, to the condition of a six years' ship, and a six years' vessel in this period may be supposed to be reduced to a condition to which no class whatever would be assigned. Making every allowance for excess of caution, enough remains to show that the annual depreciation of the iron plates is considerable; and this, added to the cost of frequent dock-

ing, scraping, and painting, cannot leave much difference between the annual expense of maintenance of wood and iron ships."

Neither is the additional cost of steam-power required to produce an inferior degree of speed in the ship by any means a trifling consideration when the class of the vessel is one of large dimensions and horse-power. Upon this point I will put another reliable witness into the box, again making the selection from the Institute of Naval Architects. At the meeting of 28th February, 1861, Admiral Halsted spoke these words:—"Now I come to another terrible business, and one in which I hope my colleagues in this institution will take a leading part. Here is the *Warrior*, with her 1,250 nominal horse-power engines, to go 14 knots an hour. But pray for how long? How many weeks will elapse at sea before the fouling of her bottom will reduce her 14 knots to 12, and even below that? As everybody here knows, perhaps better than myself, the fouling of the bottom of iron ships is a question connected, and closely connected, with the nature of the material itself; but I think it is not generally understood that it is not a mere question of the difficulty of preventing the corrosion of the bottoms of iron ships. There are a dozen ways by which actual corrosion of the metal may be prevented, but the misfortune is that all these appliances have the effect of presenting such an enticing surface to marine substances and animals that they carry on their little operations till there is no end of them, and in six months the surface of the bottom of your ship is destroyed, in a great measure, for all purposes of speed. It is wonderful, the money which has been paid away in this country on that account. We possess some 600 iron screw ships, and there is not one of them but is subjected to this difficulty at least twice a year. And it is not the mere expense of hauling into dock, cleaning the bottom, and re-painting; but it is the number of steam horses that have to be fed to their fullest extent constantly, although the effect produced by their efforts is gradually diminishing. Neither is it that the steam horses cannot take their amount of food; on the contrary, the tendency is rather to overfeed them at such times, so that the reduced speed has no compensating economy, but the whole effect is direct loss. What, then, should prevent the council of such an institution as this submitting that some definite means should be taken to overcome this disreputable fact, which has exposed us to so much public loss up to the present day? There are men of talent in the country who can discover a remedy, or who, at all events, can show us that it cannot be done, and then we may find out some substitute in place of a remedy. I attribute our neglect of this point entirely to the fact of the Government condemnation of iron ships hitherto as being unfit for the purposes of war. Had it not been for that most unjust and impolitic condemnation, I believe a remedy, or a substitute, would, as a great national object, have been provided long ago."

Two explanations are necessary to give full effect to the meaning of this speech. In the first place we must bring again to mind that the then apparently incurable disadvantages of the corrosion and fouling of iron ships had so alarmed the Admiralty in 1847 that the sale of the iron ships in our naval service was actually commenced. The persuasive eloquence of the projectors of anti-fouling and anti-corrosive compositions however had a happy influence upon the fate of the British iron navy, and the recalling of that desponding fiat is really the only good that ever has been—and in all human probability ever will be—effected by those senseless and fallacious nostrums. In the second place, we should observe that when copper is put upon and in connection with iron in sea water, not only is the waste of the iron terrifically increased, but the copper itself on the other hand becomes totally inoperative and entirely ineffective. It no longer degrades; it is electro-chemically preserved. It no longer maintains, as it would do upon wood, a clean surface; exfoliation no longer takes place, and in proportion as the superficial area of the iron approaches that of the copper so will the latter be more and more coated with thicker and thicker deposits of the carbonate of lime and magnesia abstracted from the sea water, until the whole of its anti-fouling character is lost and the ship might be but an encrusted rock, covered with luxuriant fields of sea-weeds and adherent mollusca floating upside down.

This fouling is exceedingly expensive at all times, but it would be particularly perilous and vexatious in that of war, to be obliged constantly at short intervals to send our large transport and iron-clad ships into dock for cleaning alone; the retardation of the speed, too, of such vessels whilst at sea is a most serious item, not only in regard to their effectiveness when in pursuit of, but when brought into hostile collision with the enemy. Even in money expenditure it involves a really reprehensible waste. In respect to the mere operation of cleaning, it is notorious that many of our wealthiest shipowners and some of our finest commercial companies prefer to let their vessels run considerably fouled rather than incur too frequently the expensive operations of cleaning and scraping in dock. It may be also said that the merchant shipowner experiences an additional loss in the laying by of his ship, for it is the most active employment of his vessel that produces the most profitable result.

Again, the immense size of our iron-clads would render delays in getting into dock on account of insufficiency of tides, constant occurrences, while similar delays would also happen in respect to their liberation. Long and dangerous absences would thus be common amongst the vessels of our fleets; and more than possibly at the very time when our utmost naval strength would be wanted, half our vessels might be away, either in dock cleaning, or returning home for that purpose, or on the voyage out again after the operation had been performed. Let us, however, look for a moment, as closely as the little light that has been permitted to be shed on the subject will allow, at the money cost involved by this fouling.

The *Diadem*, 800 nominal horse-power, burns 60 tons of coals a day, and does nine knots per ton burnt. Now, if the loss from fouling amounted to one knot per ton burnt, the waste per day of steam fuel would be £14, adding to which the extra cost of wages for the loss of time on a long voyage or a naval cruise, and other items, would bring the loss to something like £25 a day. Again, if the *Warrior*, 1,250 horse-power, and burning not less than 100 tons of coal a day, should lose two knots an hour, or one-seventh of her speed, by fouling, the utterly wasted cost of this deterioration of speed—for be it remembered the full quantity of combustion that would give the highest speed with a clean bottom is required to attain with a foul hull this lower rate—would be, supposing English coal were used, £30 a day; and if fuel had to be bought at foreign stations—a most probable and frequent necessity—this expense would range from any increase up to more than double. When to this cost of fuel we add wages and other incidents we shall find that the estimate of £40 a day formed by Admiral Halsted in 1861 of the money value of the loss in this vessel is really within the mark, and entirely within the actual expenditure. With 30 vessels afloat, and assuming the average loss from each as £30 a day, the total waste for the whole fleet would be £900 per diem, or £329,500 a year from this one source of fouling alone.

In the face of all these evils there is but one hope for the practical application of copper. It is the perfect insulation of the sheathing from the ship. This is the point where Mr. Daft began, and no man has been more successful than he has in this direction.

In the year 1849, impressed with the importance of preventing iron ships from fouling, and protecting them from corrosion, he made his first step by coating the famous Muntz's metal with an insulating material upon one side, in order to prevent galvanic action being set up when such metal was applied to the skin of an

iron ship. He succeeded at that time in firmly attaching sheets of pure vulcanised india-rubber to sheets of yellow metal, and when the coated sides of these sheets were placed against the hull, the yellow metal was as perfectly insulated from the iron as it is possible to insulate metals in sea-water.

The extra care required in the workmanship, and the high price of the copper, were circumstances tending much against the system of insulated copper sheathing, however desirable it might otherwise be. But the fatal objection was that, no matter what might be the care, no matter how perfect the insulation, the connection of the two metallic elements was ever liable to be made by a variety of accidents, indeed, even the overhanging of the anchors, or of an iron chain, might be the medium of setting up destructive galvanic action in a fully sheathed ship.

But there is a still more costly and even more fallacious attempted avoidance of the difficulty. I mean the faint-hearted compromise between iron and wood. Iron ships are not kept clean at sea; wooden ships copper sheathed are. Therefore, say the compromisers, let us build ships with iron frames and wooden skins, that we may nail the copper on their hulls. Composite ships are the disgrace of the age; they are a standing reproach because they are sneaking confessions of failure and incompetence. Who that knows the value of iron, that has taken action in, or even but watched, its manufacture and its practical treatment in any of its multifarious applications, but feels the same glowing pride in its stalwart strength, its metallic muscle and fibre, its reliability and thorough powers of endurance, as he does in his own birthright to the name of Englishman, and but thinks all the higher of his countrymen that they are unsurpassed as iron-workers.

Convinced that the system of insulated copper sheathing was and ever must be imperfect, Mr. Daft turned his attention to another metal—zinc, and at the same time set himself to overcome the difficulties which had been experienced in attaching the copper plates to the iron hull. Cement and all sorts of adhesive compounds had turned out complete failures, and nothing but the old plan of nailing the sheathing on, as it was done upon wooden ships, seemed likely to answer.

To make an iron ship and then to cover it over thickly with wood—to put, in fact, the iron ship inside of a wooden one—seemed to him, as it must still do to every competent person, a most undesirable and unscientific procedure. Having by his experiments convinced himself thoroughly of the value of zinc sheathing, he devised the most simple and admirable plan for the firm attachment of the plates that could possibly be desired, and in doing this he has made the most important improvement in the construction of the iron ship itself. The butt-joint was the weak part of the ship; Mr. Daft wanted a groove around every one of the skin-plates which he could fill with wood, as the medium to which to nail his zinc sheathing plates, and in getting his groove he got rid of the butt-joint. But of this, hereafter; for the present we have to deal with zinc.

With zinc sheathing we have the following advantages:—It is one-third the price of copper, or yellow metal; it requires no insulating material, nor anything whatever interposed between it and the iron skin of the ship; it electro-chemically protects the iron, and is itself degraded and imperceptibly peeled away by the same electro-chemical action; it keeps perfectly bright and clean, and is as durable as copper or Muntz's metal.

Of these assertions some proof will naturally and properly be asked. Cabinet experiments might be possibly deemed not sufficiently practical upon such an occasion as the present, however interesting and instructive. I bring forward, therefore, the results of actual trials of the system made by the government.

After proving the value of zinc as a sheathing for iron in sea water, in conjunction with the "Special Committee on Iron," in 1863 and 1864, Mr. Daft received instructions from the Lords Commissioners of the Admiralty, on the 18th February, 1865, to visit Portsmouth-yard, in order to see that certain experiments with two plates upon his plan were satisfactorily made for testing the efficacy of zinc sheathing for iron ships.

Two plates were made up of $\frac{3}{4}$-inch plating, with $\frac{3}{4}$ straps at the back or inside, so as to represent the actual plating of a vessel of some 3,000 or 4,000 tons, and grooves according to Mr. Daft's patent were left, of $\frac{3}{4}$-inch wide, between the edges of the plates; these grooves were subsequently filled in with teak strips, and the surface made fair and flush. The plates were encased in teak frames and backs, made waterproof, so that they (the plates) should have their faces or outsides only exposed, as in the case of an actual vessel. Mr. Daft's original intention was to nail on the zinc sheathing direct against the bare iron, in order that the contact between the zinc and iron should be perfect, and that the necessary amount of electro-galvanic action should be set up when the plates were lowered into the water to keep the zinc exfoliating or peeling away at a rate which would keep them clean and bright; but by instruction the iron was coated all over with a composition in fashionable use in Her Majesty's dockyards—Mr. Hay's glue—and contact had therefore to be established by using nails for fastening on the sheathing long enough to go through the teak-caulking in the grooves and to turn against the iron at the back of it. A few *iron* nails—common clouts—were introduced, in order to establish firmer and more enduring contact, and to prove that they might be used, if not to advantage, certainly without detriment to the work.

The unfortunate interposition of an insulating substance between the zinc and the iron would have rendered the former liable, but for the action established by the long nails, to foul to a certain extent. In fact, the insulation directed, would, if it had not been practically subverted by this means, have produced in the experiment results parallel with the case when zinc is used for sheathing wooden vessels. This test was a source of anxiety to Mr. Daft, which was only dispelled when, on the 12th Oct., 1865, the plates were raised for preliminary examination (as they were to be twelve months under water for the trial). At this examination, after six months' immersion, they were found perfectly clean, though not bright, as would have been the case had the chemical action not been checked by insulation. The zinc had not wasted enough. An ounce per foot per annum—the rate at which it had been disappearing—was not sufficient to ensure a bright surface, a bright metallic surface being that of all others the most to be desired for obtaining speed in iron ships or wooden vessels. This fact, that the zinc could be kept perfectly bright, having been thoroughly established previously by Mr. Daft, induced him to cause a third experiment to be made at Portsmouth.

At the end of the year of trial, a correspondence took place between Mr. Daft and the Admiralty as to raising again the two plates; but, as summer was approaching, it was suggested by the Admiralty that they had better remain three months longer. They were thus doomed to go through another season for the rapid growth of weeds and barnacles, which, as any naturalist will quickly perceive, was subjecting them practically to another year's trial, by including two spawning seasons of the barnacles and molluscous animals, and two seasons of the fertilising periods of the seaweeds, giving the plates, in fact, a double chance of fouling. This suggestion was, however, readily agreed to by the inventor, and when they were taken up for the inspection of the Lords Commissioners of the Admiralty, on the 12th of August, they were found still in a state of the most perfect cleanliness, though, as before, not bright. About the frame, and on the iron chains in which the plates were swung, were immense quantities of barnacles and weeds, but not a vestige on the plates

Mr. Daft then suggested that one or both plates should be stripped, and everything—zinc, nails, teak, iron, &c. —thoroughly overhauled, and an accurate account taken of the loss of the zinc; and this was, he believes, with respect to one plate, accordingly done. Not that the "authorities" have furnished him with particulars, but having asked for that favour he is in hopes of getting them. However, it may be asserted without fear of contradiction, that the zinc had lost only at the rate of exactly 1 oz. per foot per annum. It would be better that it should lose double that quantity.

One ounce per foot per annum is not much more than zinc sheathing loses on wooden ships, where a very feeble galvanic action indeed exists, and possibly at times none at all, when fouling more or less occurs. Not, as we have already stated, that fouling is peculiar to zinc alone, for other sheathings—copper and yellow metal—foul to the same extent as iron or zinc, or any other metal, when their condition is made negative in an electro-chemical sense. If, for example, contact with iron and copper and yellow metal be made in sea water, then yellow metal and copper will foul rapidly at the expense of the certain destruction of the iron—the positive metal. Mr. Daft thinks that in order to wear out the old wooden ships with as little expense as possible, and yet keep them useful and safe as long as they could be, it would be wise to use iron nails and zinc sheathing, for the zinc would preserve the iron fastenings about the vessels, and the clouts (iron nails) in the sheathing would hold the zinc on longer than zinc nails, and materially aid in keeping it clean by increasing its exfoliating qualities. Zinc for wooden ships under this treatment would become equal to copper or yellow metal for cleanliness, would last quite as long, and would cost not more than one-third the price.

To ensure a thoroughly clean surface, the "peeling away" should go on at a rate of not less than 2 ozs. per square foot per annum. At that rate it is kept absolutely bright, and may be still further increased to 2½ ozs. by leaving certain parts of the hull unsheathed—for example, the keel, stem and stern posts, &c.—for by exposing a greater proportion of iron than zinc (within certain limits) the zinc is more rapidly destroyed, while, as I have in another place shown, the uncoated iron is, notwithstanding the immediate absence of zinc, kept free from fouling for some reason that at present I fail to perceive.

An exceedingly useful feature is the power that is possessed within certain limits of thus modifying the electro-chemical action on the zinc. There is a definite relationship between the extents of the surfaces of the iron and the zinc, and the rate of the exfoliation is in exact proportion to the areas of the two metals. The electro-chemical action can therefore be modified, accelerated, or retarded, according to requirement, by the proportion of the ship that is sheathed, or by internal plates in connection with the bilge-water. Thus, sheath one-quarter of the iron, you give half the superficies of zinc to iron, and in this state, when immersed, the destruction of the zinc is at a medium point, and the iron is perfectly protected. Now reduce the sheathing to $\frac{1}{8}$th = $\frac{1}{4}$th of the surface, and you increase the destruction of the zinc, but the iron is still fully protected; still further reduce the zinc to say $\frac{1}{16}$th = $\frac{1}{8}$th the surface of iron, and you arrive at the maximum destruction of zinc. Go further in this direction, and you do not increase the destruction of zinc, but you enfeeble the protection of the iron.

Entirely cover a surface of iron with zinc; you then have two to one of iron; in this state the exfoliation of zinc is feeble, but quite enough to keep it bright in sea waters. The iron when completely covered is, of course, fully protected by the electro-galvanic action exerted upon the zinc, and, in fact, a singular proof of this has just occurred in the Admiralty specimens inspected by the Lords at Portsmouth. A plate, grooved and caulked with teak, about 2ft. 1in. by 1ft. 1in. was partly plated with zinc, in order to try the comparative results, and a margin of bar-iron, about 3in. wide, was left around the sheet of zinc. This specimen had been under water about ten months; the zinc was beautifully bright and clean; the margin of iron was only coated with a little slime, which, upon being rubbed off by the finger, discovered a bright clean surface; the wood frame about this specimen, which had been fixed to it for lowering it into the water, was an enormous mass of polypi, barnacles, and weed, thus proving that the zinc had a protecting effect to some distance beyond the actual surface covered by it.

The moment we come, with a proper knowledge of the natural history of the subject, to investigate the nature and character of fouling, and what should properly be its most perfect prevention, we come decisively to the unalterable conviction that all anti-corrosive and anti-fouling paints can never be any more than the merest nostrums. Barnacles do not feed with their feet; oysters do not imbibe nutriment through their shells; mussels derive no vital sustenance through the cords of the byssus by which they moor themselves. Seedweeds are not like land plants, which take up their supporting fluids by the fibres of their roots. The "root" of a seaweed is no more than the mere disc of attachment, the leather "sucker" which holds it to the rock or to the side of the ship. The idea, therefore, of poisonous compounds for painting a ship, with the view to killing the barnacles, shell-fish, and seaweed, is to the mind of a naturalist much on a par with a project for poisoning a man through the sole of his boot. The individual who should propose to smear the ground with phosphorus and arsenic to destroy an invading enemy would be sent to Bedlam, but the quack who offers arsenical and phosphoric soaps for ships' bottoms sells his wares and injures no one but his customers.

There is another view to be taken of the natural history of shell-fish and seaweeds. All the things that attach themselves to a floating ship only stick to it, and the proper cure therefore is never to leave them any surface to stick to. Why copper on a wooden ship keeps clean is because it never has a permanent surface, and it is evident nothing can long adhere to a surface that is always dissolving away. Now, it is only in the young state that either marine organisms or vegetation have the power of attachment to foreign bodies. Pull an oyster from its bed, or a seaweed from its rock, and neither is ever a fixture anywhere again. If, then, the minute young only of shell-fish and the minute seeds only of sea-weeds possess either free or involuntary locomotion, it is clear they can only adhere to very minute portions of any solid surface, and, therefore, as the extent of their adherence is not larger than the exposed surface of a metallic particle, it is evident that the exfoliation of that particle will carry away with it the minute organism attached; and it is also as evident that as that organism has only once in its life the power of attaching itself, its capacity of individually contributing to the fouling of any ship is gone for ever. The exfoliation of the metal of a ship must, therefore, be constantly going on. The voyages which the vessel undertakes will take her from winter in one latitude to spring time and spawning and seeding season in another; and wherever and whenever the myriads of young mollusca, cirrhipedes, serpulæ, corallines, bryozoa, and terodines, swarm in the sea, then and there will they seize upon every bit of the vessel within their reach, and so long as the surface of the hull remains will go on growing and prospering to the serious detriment of the progress of the ship. It is equally evident, under this aspect of the case, that fouling can never be prevented by any vitreous or glazed substances attached to the hulls of ships. However smooth or polished, however slippery any absolute solid permanent surface may be supposed to be, young barnacles, oysters, mussels, take too good a hold upon it, and the little floating seeds of sea-weeds stick too close to it ever to

slip off, and can only be got quit of by being "slipped away with" by the flaking of the surface itself.

Needless as any proof on this subject would thus appear to be, it is, nevertheless, imperative to put in an example or two of actual results of anti-fouling paints. These results are of two distinct characters. One, the effects produced in respect to the fouling of the hull; the other, the effects produced upon the iron, for many of these anti-fouling and anti-corrosive compositions are by no means innocuous to the constructive material of the ship. I really am very sorry to select "Hay's anti-fouling paint" as an illustration, because Mr. Hay is the Admiralty chemist, and his "composition" is under the immediate patronage of the Admiralty. But I take it because it should be, from the recognition it has received, presumably the best of its class; and because, if I did not take it, I should hereafter most probably be accused of having insidiously picked some inferior example, designedly leaving out the very one I ought to have brought forward in justice to the anti-fouling painters. I quote from the *Times* of 18th November, 1864—not an unfriendly organ towards the dockyard officials:—

"Notwithstanding the numerous descriptions of what are termed 'anti-fouling' mixtures, which have been submitted to the Admiralty, no discovery appears as yet to have been made of a preparation for effectually preventing the accumulations of animal and vegetable matter over the hulls of iron vessels.

"Although the bottom of the iron frigate *Achilles* was coated over before her launch with the 'anti-fouling' composition of Mr. Hay, the Admiralty chemist, so foul had the bottom of this vessel become while lying in Chatham harbour, preparing for sea, that in the run from Chatham to Devonport her speed fell off more than three knots an hour from her steaming rate on the occasion of her official trip at the Maplin Sands.

"When docked at Devonport, the bottom of the *Achilles* was not only foul, but many of the plates were left completely bare of composition, while corrosion had in many cases eaten away the plating to the depth of from one-sixteenth to one-tenth of an inch."

I can add my own testimony, having seen the *Valiant* put into dock a short time ago, after 16 months in harbour, that the condition of Mr. Hay's composition, or of the iron vessels coated with it, has been in no wise improved; nor can I conscientiously say one single word in favour of any other of the "compositions," anti-fouling or anti-corrosive, with which various portions of that noble iron-clad was besmeared. Mr. Hay's compound has a basis of copper, and the hull of the *Valiant* was deeply eaten into by the galvanic action, as well as thickly and totally encrusted with a bronze-coloured oxide. It certainly was not so foul as some other portions of the ship, but it would not have been even in a semi-clean state if it had not been "hogged" by some new patented scraping machine before the ship came into basin.

Doubtless I should find I had left a hole in the armour of my argument if I omitted to say a few words upon the other metallic paints in which other metal bases are used—as red lead, quicksilver, and zinc. I assert of all such, without fear of defeat—contradiction on all points I know I may expect—that no paint having the oxide or other salt of any metal can possibly be of any use in the prevention of fouling; and not even if the absolute metal itself in a pulverized state could be mixed in with the oil, varnish, or other medium, would such a paint have any preventive influence. Take zinc itself in fine powder, for example; it would be utterly useless, because each particle of the metal being encased in and insulated by the medium of the paint, galvanic action would be stayed, and there would be no exfoliation of the surface—the sole means of avoiding marine foulness. In the cases of red lead, mercury, plumbago, and antimony, if they have any effect at all, it will not be upon the barnacles and sea-weed, but upon the iron hull; and this any action they may exhibit will not tend to improve the condition of. Some owners use merely a thick coating of simple grease for ships going on distant voyages, and so long as the friction of the water can carry off the weeds when they have acquired a certain size, it may possibly do so as long as the grease lasts—but what then? Fouling of the iron hull of course sets in. How far efficacious this plan may be, in even its best circumstances, I know not, but this I do know, that one large house that has wisely eschewed anti-fouling compositions, and uses this less hurtful means, pays probably the largest sums, and certainly takes more care and pains in docking, scraping, and painting its ships than any other in the port of London. And it is well repaid for this expenditure. Paints of all kinds must be peculiarly liable to be rubbed and scraped off, and of course the iron hull over such portions would then be completely unprotected, and fouling and corrosion would go on as it pleased.

I have been thus severe, but no more so than is deserved, upon paints and coating compositions of all kinds, because one of the antagonisms zinc sheathing has to encounter is the notion entertained by sailors and owners, and particularly the former, that they should have "something to paint the ship with." A sailor naturally likes to paint his ship, for much the same reason as a child his toy-boat; and owners abide by paint for their iron ships because they don't know what else on earth to do with them; and because to sheath them with copper is highly dangerous, as well as expensive.

Another antagonism to the trial of zinc sheathing amongst merchant shipowners, is the objection they have to having anything done to the skin-plates for the purpose of securing the sheathing. Mr. Daft effectually secured his insulated copper by drilling holes partly into the thickness of the skin-plate, and plugging them with wood or ebonite, and then driving the nails which secured the sheathing into these plugs. For myself, I see no objection whatever to this plan, but shipowners are excessively timid about the slightest mechanical operations, although they have no suspicion or fear of chemical action being painted all over their ships.

We have so far taken a broad survey of the nature, character, and action of zinc sheathing; and are brought now to a consideration of the best way of putting it on.

It appears, then, that in order to perfectly protect iron hulls for an indefinite period from corrosion—in fact, to preserve their thickness in its full and original integrity, until every other part of the vessel is thoroughly worn out—we have only to plate the bottoms in a simpler, cheaper, and safer method than has ever before been done. This Mr. Daft has accomplished by making all the joints lap-joints, and entirely avoiding butt-joints and their costly and evil consequences. To make the laps fair and flush and perfectly water-tight, they are, in addition to the ordinary punched caulking (if that be thought desirable), caulked with properly prepared strips of compressed teak, and then the zinc sheathing is most firmly secured by nailing on the sheets to the teak in the grooving in the ordinary manner of fastening copper sheathing on wooden vessels, the zinc being, at one and the same time, the complete preserver of the iron hull and the essential metal for keeping the bottom perfectly clean for a number of years proportionate to the thickness of the sheathing used. If, for example, a sheathing of one-twentieth of an inch thick be used—as a good stout sheathing fit for a vessel of 3,000 to 5,000 tons would be—it would weigh 30 ozs. to the square foot and assuming a loss of 2 ozs. per annum, and that when it was reduced to half its thickness re-sheathing would be required, we have at least seven years of a clean and safe bottom without the least anxiety about it as to fouling or corrosion. It is important in its place to determine the size and shape and appointments of our new iron fleet, but it seems out

of place to do anything before the very base and foundation of the superstructure be settled. If our magnificent broadsides, cupolas, monitors, or whatever we may come to, be dependent upon any description of paints or compositions and be really wanted on service, they must all go to ruin by corrosion before the end of a commission, or come into dock every six months to have their hulls cleaned and re-painted, to say nothing of the diminished value of a vessel which begins to foul from the day she leaves port, and gradually but surely gets worse until her boasted speed is reduced to two-thirds, and even to half its original rate.

Almost all iron ships as now built present longitudinal rows of plates alternately projecting and receding—"in and out strakes," as they are called by ship-builders. In these strakes the joints are of two kinds—one made by the over-lapping of the edge of one plate upon another, and called the lap-joint; in the other, the edges of the plates are planed smooth, and the ends brought close to each other, the joint being made good by the riveting of the ends of both plates to a common back-strap. That is termed a butt-joint, because the two ends merely "abut" against each other. The lap-joint is in every way by far the stronger; the rivets penetrating both plates, and being driven in red hot, by their shrinkage exert such power that the lap-joint, if properly made, is absolutely stronger than the plates themselves. But such is not, and never can be, the condition of the butt-joint. That is a form of joint that in its essential character is the very weakest possible. It is really of the nature of a plate half cut through; and a very correct general notion of its condition may be given by comparing it to a plank sawn across to the half of its thickness. Because a saw-cut was formed of three pieces, a plank cut quite through and a back piece, it would not cease to be a saw-cut, and just so, although the butt-joint is formed of the two ends of two plates and a back-strap, the line of particles in that back-strap facing the seam between the ends of the plates will be that portion of the metal which will have to endure all the strain brought upon the joint. A saw-cut weakens a plank more than the proportion of its depth to the original thickness, because there is a leverage of the substance of the wood, brought to bear during any strain, that opens the cut upon the front line of particles of the uncut remainder of the plank, and which is thus liable to be rent asunder, and in this way the crack is easily continued. The back-strap of a butt-joint is always in the condition of the remainder of a saw-cut plank; and, as such butt-joints are used for the vertical joints of the strakes, there are many hundreds of such butt-joints in a ship always liable to be strained open and split, and that, too, it may be all over the ship. When vessels strain across ocean waves the butt-joints are exceedingly likely to give way, and many iron vessels have gone down from no other cause than the opening of their butt-joints. When iron vessels are strained, it is usually along the lines of butt-joints that they part asunder; and, in brief, all the accidents that arise from the defects of, or strain upon the fabric, may be set down, with hardly an exception, to the giving way of the butt-joints. No one ever heard, that I know of, of lap-joints, where the workmanship was good, giving way; but the iron-shipbuilder prides himself upon the finish of his butt-joints, and thus in the very pride of his craft confesses the inherent deficiency of the butt-joint. Why should he pride himself upon the extra care and finish bestowed upon it if it were as good as the less cared for lap-joint; and why should he use the lap-joint for his horizontal strakes, and make an uneven irregular hull for the ship, when with the butt-joint he could make a fair and flush hull if the butt-joints were not inherently worse? He certainly would reject the lap-joint if it were not for its superior strength. But the weakest part of a ship is its actual strength, and therefore as the lap-joints are its strongest parts, the butt-joints detract from the entire stamina of the vessel. Now, in putting the groove round each plate for his infilling of teak, Mr. Daft uses a plan which entirely gets rid of the defective butt-joint altogether out of the ship. By putting the plates an inch apart he takes the joint out of the category of a saw cut, and by putting a narrow plate of the same thickness as the skin of the ship at the back of the joint he virtually reduces the in strake from three feet wide to one inch in width. It is still, however, of the nature of a strake; and the metal of the inner plate, when any strain comes upon it, has sufficient extent of surface to bend into an arch, and, no single line of particles having to bear more than its proper share of the strain, there is no longer any liability for the metal to be pulled apart or to crack. The extravagant expense of planing the ends of the iron skin-plates is entirely done away with, the edges of the plates being left just as they come away from the shears, and the teak, carefully dried, compressed and forced tightly in, securely caulks the joint, and makes the entire surface of the hull perfectly fair and flush. The whole construction of the ship under this process will be quicker and cheaper than ever: there will be no inequalities in the rigidity or strength of different portions; no sharp edges to encourage the commencement of oxidation and fouling; and there will be the most suitable means of nailing on a metal sheathing to protect the iron hull from corrosion from salt water when afloat. What Mr. Daft has done really is to have turned the insecure butt-joint into double lap-joints; the result is mechanically right, and the wonder is that it was not seized upon by every builder the moment it was devised. But strong is the force of habit; and it is a common failing of men to cherish most highly that which has given them the most trouble. Troublesome things, however, like troublesome people, are seldom good for much.

Both subjects, the construction of iron ships, and zinc sheathing, permit a great deal more to be said about them; but a paper for a society's evening meeting cannot go to the extent of a volume. I will, therefore, only add that, as wooden ships are still built in large numbers for foreign voyages of long duration, solely because of the fouling of iron ones, I do believe the adoption of Mr. Daft's process of zinc sheathing, by enabling iron ships to undertake voyages of any length of time in a perfectly clean state, will throw into the iron ship building trade all the orders that would otherwise go, as now and heretofore, to the builders in primæval wood. Iron ships are incomparably stronger, and are much lighter than wooden ships and can be made on finer lines.

I now ask full discussion on these subjects, in which, I have become interested in the firm conviction of their correctness and importance; and which, for those reasons, I wish to see put to practical trial by shipbuilders and shipowners.

DISCUSSION.

Mr. Haddan said, he was afraid that Mr. Mackie had sought to prove too much, for this reason—that if all he had stated was correct, iron vessels would wear four or five times as long as they do now, and, consequently, the trade of shipbuilding would be reduced to the extent of four-fifths, unless a very greatly increased demand for ships arose. He had himself tried to induce people to make important changes in materials for manufacturing purposes. Some years ago he brought forward a plan for building railway carriages with *papier-maché*, which would last twenty years; but on introducing the subject to a carriage builder, he would not entertain it for a moment, because, he said, he did not want carriages to last for twenty years, for if they did, what would become of his trade? But, he added, if he could show him a plan by which they would last only a year, he would take it up. He could hardly suppose that the Admiralty authorities of the country were influenced by these feel-

ings, but he thought that they were in the habit of waiting to see what other countries did; and he believed, if Mr. Mackie or Mr. Daft could induce the Emperor of the French to try this plan of zinc sheathing on one of his vessels, and it succeeded, our government would adopt it instantly. He considered this invention a very important one. He was not a shipbuilder, but understanding something of the properties of iron, and hearing the explanation of the system which had been given this evening, he believed it to be a sound one, and he hoped public pressure would be brought to bear upon the government to give it a fair trial.

Mr. G. B. Galloway submitted that the question before the meeting was one of paramount national importance. He would refer to a statement which was made in this room at the meeting of the Institute of Naval Architects in 1865, by Sir John D. Hay, one of the present Lords of the Admiralty, who said that unless some mode were discovered to preserve the bottoms of iron ships, in a short time we should have no iron navy in existence. He (Mr. Galloway) begged to ask the author of the paper at what dates the tests of this invention had been made under the auspices of the Admiralty authorities?

Mr. Mackie replied in 1863 and 1864, at Shoeburyness, and from 1865 up to the present time at Portsmouth.

Mr. Galloway said the quotation from the *Times* which had been read, lamented that no discovery had been made for the preservation of the bottoms of iron ships, while they had the fact before them that these tests were made prior to the date of that article, when proofs had been afforded that this system was most certainly a valuable one. It was a national disgrace that, in the face of this invention, there should still be going on the enormous waste of public money resulting from the fouling of the bottoms of our iron navy.

Mr. C. F. T. Young said he had listened with great satisfaction to Mr. Mackie's paper. He had had many opportunities of observing the evils which resulted from the fouling of ships' bottoms, the effects of which had been in no way exaggerated by Mr. Mackie. The idea was still held that the copper bottom of a vessel kept clean because it was of itself a poisonous material. However poisonous it might be in itself, it had not a destructive effect upon the organisms which infested the bottoms of ships. The rapidity with which this fouling proceeded was hardly to be credited. The Southampton pilot boats, during the summer months, had to lie ashore every fortnight to clean off the fouling, and the St. Maur pilots had to do the same. It was stated that the *Gloire* and other French ironclads had on an average passed 55 days each in dock during a period of little over 14 months, only to remove the fouling. With regard to the cost of keeping ships' bottoms clean, it was stated that the P. and O. Company spent £70,000 annually, simply for keeping their ships' bottoms clean. One iron ship of 800 tons, which had been eight months in a warm latitude, had 30 cart loads of barnacles taken off her bottom, an estimated weight of 28 tons. It was calculated that our iron-clads had each to spend 14 days every six months in dock to remove the fouling, although they were frequently hogged. The iron steamer *Megæra* was found to incur an increased cost in running of £23 per day through having a foul bottom, the same amount of fuel only producing seven knots an hour in place of ten. It had been proved, from careful tests made with the Dublin and Holyhead mail steam packets, which were very fast boats, that, after they had been out of dock two months, their speed uniformly fell off from half a mile to one mile per hour, from fouling only. With regard to the alleged poisonous effects of copper, anyone who had seen the oysters on the coast of Cornwall knew that they were perfectly green coloured from being impregnated with copper, so that it was impossible to eat them, and yet they lived and thrived. Eighty tons of barnacles were taken off the copper bottom of an old wooden ship which was broken up some years since. About a year and a half ago an experiment was tried, at the instance of the Scottish Shipbuilders' Association, as to the powers and advantages of the so-called poisoning process. The four quarters of an iron plate were each thickly coated with the most poisonous compounds that could be found—arsenic, corrosive sublimate, &c., and the plate was immersed in sea-water for some months. When taken up it was found to be in the most foul condition possible, and it so happened that the largest barnacle of all had placed itself at the junction of all the four compounds. It would hardly be believed that there were persons who, even at the present day, would deny the existence of galvanic action; but it would seem that this idea was held more generally than would at first be supposed, when we found the use of yellow metal and copper on iron ships still adhered to in the navy. Mr. Young called the attention of the meeting to a piece of iron plate on the table, which had been experimented on, by covering it with Muntz's yellow metal, insulated from the iron by vulcanised india-rubber, and although the edges were protected so that no water could get between the copper and the iron, yet, after having been immersed for several months, the iron was found to be very much eaten away, owing to the galvanic action. The *Achilles*, when docked at Plymouth, was found to have her plates eaten in from $\frac{1}{16}$ to $\frac{1}{10}$ of an inch deep, and was very foul. Numerous other instances were given. The *Royal Oak* iron-clad, with a coppered bottom on a wood sheathing, was found to have had her plates eaten by corrosion to the depth of three-eighths of an inch in less than eight months. With regard to the employment of poisonous paints, if the barnacles held on by their mouths there might be some sense in using them, but they hold on by their feet instead. Some of the barnacles taken off a plate painted with arsenic were boiled and given to a cat, and the animal died with all the symptons of arsenical poisoning, while the barnacles themselves remained wholly unaffected by the compound.

Mr. Botly said they were much indebted to Mr. Mackie for the paper he had read; it was a matter of the greatest importance, not only to the Society, but to the country at large, that such a subject should have been brought forward. The paper treated of two great improvements in the construction of iron ships, viz., the lap-joint for the plates, and the zinc sheathing as a protection against fouling. Both these matters were of the utmost importance, and deserved careful consideration.

Mr. Campin asked whether the action of the zinc sheathing, in keeping off the barnacles, was supposed to be due to the electric current, or merely to the wearing away of the surface of the zinc.

The Chairman said the paper sufficiently explained that it was the slipping away of the surface of the zinc from the feet of the barnacles, by exfoliation of the metal, which kept the bottom clean.

Mr. Blackie inquired whether the zinc to be used for sheathing was prepared in any special manner, different from the ordinary mode of manufacture.

Mr. Mackie replied that the zinc was prepared in the usual way. It might, however, be found desirable to adopt some annealing process, to get rid of any extreme rigidity of the metal.

Mr. Blackie remarked that those who had zinc water-cisterns would probably have observed that an incrustation took place on the zinc. He would like to know whether the action of fresh water on zinc was different to that of sea water.

Mr. Mackie replied that fresh water would produce a deposit on the zinc by evaporation; but when iron was present, salt water set up a galvanic action between the two metals.

Mr. Blackie then called attention to the question of the expansion and contraction of zinc as compared with iron, and expressed his opinion that there was great

liability of the zinc cracking. He would also like to be informed as to what would be the cost of plating a ship with zinc as compared with copper, the cost of cleaning being added. The cost of sheathing a vessel's bottom with zinc, he apprehended, would be considerable, and it appeared it would require to be renewed, owing to the wasting of the metal, in the course of a few years. The question, therefore, arose, whether the cost would not be greater than that of docking the ship occasionally, and clearing off the fouling.

Mr. E. J. Reed (Chief Constructor of the Navy) said the paper appeared to be a very able and interesting one, but one or two things had been said in it which he could not allow to pass without notice. He thought the theory enunciated as to the weakness of the butt-joint, viz., that there was liability of the joint breaking at the line where the plates touched, was erroneous; in practice it was found that fracture, when it did occur, took place in the line of rivets. He did not say the butt-joints never broke at the line of junction; but, when they did so, it arose from the fibre of the iron in the butt-strap being put across, instead of lengthwise. His opinion was that, with ordinary good iron shipbuilding work, when pains were taken to put the fibre of the iron in the direction of the fibre of the plate, and with a slight increase of thickness of the butt-strap, it was not found that the butt broke in the way suggested in the paper. With regard to the subject of fouling, he might say that to his certain knowledge it had been a matter of most anxious consideration, and also of experiment, by the Admiralty ever since the introduction of iron ships into the navy. For two or three years the late Board of Admiralty and the Controller of the Navy sanctioned a large number of experiments with anti-fouling and other compounds, but with, he was bound to say, no very satisfactory results; indeed there seemed little promise of anti-fouling compounds doing all that was desirable in keeping iron ships' bottoms clean. He thought much was yet to be done in that direction; particularly by getting rid of the irregularities of the surface of the immersed bottom, and making it perfectly flush and even, so that it could be easily cleaned by being brushed while afloat, as was done in former times with wooden ships. But still he thought any advantage thus obtained would be very inferior to an arrangement which would secure a permanently clean bottom. The system described in the paper was certainly entitled to great consideration, in spite of any little difficulties that might at first appear to belong to it. For instance, at first their appeared to be considerable difficulty in caulking the joints, but his own feeling was that in a matter of this magnitude and importance mere mechanical difficulties of this kind would soon be got over. We had already encountered, and were still encountering very much larger difficulties, and we could not now afford to be deterred by trifles from adopting any real improvements. He might, however, say that no experiments had yet been made with this invention, which would carry complete conviction to the Government. The minds of all those persons who were responsible must first be fully satisfied. For his own part he did not attach much value to the experiments at Shoeburyness; moreover, they were on too small a scale to warrant the formation of any conclusion upon them. In many instances, no doubt, when the copper sheathing had been placed in contact with the iron, a most destructive galvanic action had taken place, but in the case of the *Royal Oak* and some other vessels, a layer of wood was interposed between the iron and the copper, and he could state that galvanic action had now been perfectly prevented. The inspection of ships on the Mediterranean station showed that the iron plates, insulated from the copper by only a single layer of wood, remained perfect. He entreated those who had the success of this invention at heart to make experiments on a large scale, such as would satisfy the Government. He believed the Portsmouth experiments were valuable, though he knew they were not conclusive to some persons who saw them. The inertia which was charged against the Admiralty in this matter was equally applicable to private shipowners, for he was not aware of this system having been adopted by them any more than by the Government.

Mr. Young remarked that it had been found that the wood sheathing on the iron plates was an insufficient insulation. This had been shown in the French and Spanish vessels. The plan might answer if the ships were not exposed to heavy seas; but by these and other violent shocks, contact between the iron and copper was often produced, and galvanic action was set up.

Mr. Mackie, in reply upon the discussion, said he was glad to have had the pleasure of listening to the remarks of Mr. Reed. That gentleman, he was sure, knew enough of him personally to be quite aware that if he used strong language in reference to the proceedings of government, it was not out of personal animosity or a desire to attack the government, or their officials, but simply because one who attempted to act upon the inertia always existing in government departments must express himself strongly, or he would have no hope of being listened to. With regard to the question of the cost of sheathing with zinc it was stated in the paper that it would probably be one-third that of copper. The copper required to be replaced on wooden ships every three or four years, while zinc would last, at a minimum, from five to seven years, and might be made to last from twelve to fourteen years, according to the thickness of it. With regard to the question of the expansion of the zinc, he believed the difference in the amount of expansion and contraction between the zinc and iron would be very small in temperatures only ranging from 60° to 70° or 80°, and would not be greater than would be relieved by a slight buckling of the zinc plate. He had not been able to go fully into all Mr. Daft's ideas with regard to the jointing of iron plates, but he had no disposition to measure his own experience in that matter with that of a gentleman like Mr. Reed. He did not gather, however, that Mr. Reed considered Mr. Daft's joint to be weaker than the butt-joint. On the question of putting the copper sheathing on iron vessels over wood planking as an insulating material, he accepted Mr. Reed's statement of the result as perfectly correct. Still it must be borne in mind that water would percolate wherever there was a crack, and so long as connection was made by the water between two opposing elements, so long he thought there was danger of corrosion by galvanic action.

Mr. Reed said he should be sorry it should be supposed that he had implied that the plan of placing the copper sheathing on wood, as an insulating material, was quite satisfactory. If the plan described in the paper were successful, it would be immeasurably superior.

Mr. Mackie was glad to hear that remark from Mr. Reed. He agreed with that gentleman that it was essential this system should be tried on a larger scale than it had been; and that this might be done was one great reason for his bringing the subject before this meeting. With regard to the putting a wooden layer to receive the copper sheathing, there was this further objection to it, that whatever quantity of wood was put on the outside of the hull, it practically increased the size of the vessel, and, to that extent, increased the amount of resistance; and for every square foot of such increase there was a loss of one nominal horse-power. With regard to the carrying out of experiments on a large scale, he would ask was the inventor of this plan bound to build a vessel at his own expense, send it to sea, and keep it there a sufficient time to afford a thoroughly satisfactory test of the merits of the system? Mr. Reed might possibly be right in saying that the experiments at Shoeburyness were worth nothing; but the experiments at Portsmouth were carried out under official authority, and he was going to

say nearly officially spoilt. If this system had merit, let it be tried on a proper scale; if it had no merit he (Mr. Mackie) would be amongst the first to give it up. By this system the sheathing could be applied to the hull of the ship direct. If it required any insulating material, however thin, it did not realise what was claimed for it. He might add that, if the Government took experiments in hand at all, the least they could do was to carry them through; because, if they did not, they put the inventor in an unfair position. He believed the system would have been tried in the mercantile navy ere this, if the trial experiments had not been in government hands; but that being the case, people naturally waited the result of the government trials. He, therefore, said, let the inventor try an experiment according to his own plans. Let him have some small iron vessel, even a condemned one, and let it be sheathed on his system. If, then, it was found wanting, let it be given up.

The Chairman said as to the importance of the subject treated in the paper there could be no doubt. It was a national question to overcome the difficulties which still attached to the use of iron vessels. Iron had been so completely proved to be the better material in naval construction that the Government had largely adopted it; and yet there was one defect attaching to it, viz., that iron ships would foul very quickly. The means hitherto adopted were clearly insufficient as a remedy for the evil. The poisonous compounds spoken of he thought might be fairly dismissed from their minds as being playthings in connection with a very serious subject. Copper sheathing appeared very inapplicable, for when in contact with iron it invariably had the effect of corroding it, because the salt water would percolate between the two metals; and moreover, the copper sheathing itself would fail in its purpose from the want of exfoliation of the surface. With regard to the insulation of the two metals by the interposition of a wooden layer, he agreed with Mr. Reed, that the iron would be effectually protected so long as no metallic contact took place. The moisture between the two metals would not be sufficient to set up galvanic action, the battery would be in the condition of an "open" battery, not a "closed" one. There was, however, great difficulty in maintaining perfect separation, because wire, even of $\frac{1}{16}$ inch gauge, was sufficient to transmit a considerable current, and produce a great amount of mischief upon the iron, and it was hardly to be supposed that the two enormous surfaces could be long kept perfectly separated without metallic connection being formed between them. What surprised him, somewhat, on hearing this paper was the very slow rate of exfoliation of the zinc. He had himself made experiments upon the action of the salt water upon zinc in contact with iron; and he found the zinc acquired weight up to about three months, but after that period a sensible diminution in weight took place. The author of the paper stated that the amount of the oxidation of the zinc was not more than $1\frac{3}{4}$ oz., or 2 oz., even if the exfoliation was made more active by an increased galvanic action. It would be interesting to ascertain whether there was any increased exfoliation when the ship was in motion. No doubt there would be some increase, but experiment would determine the amount. No doubt, chemically, zinc sheathing would protect the bottom of the vessel entirely, for even if a sheet of the metal were displaced, there would still be the influence of the zinc in contact with the iron. So far, then, the invention appeared to him to be an exceedingly promising one, and one which he thought should certainly be tried seriously by the Admiralty. With regard to the observations of Mr. Reed, he thought he had stated the case very fairly, and he believed personally he would be disposed to afford the invention every trial it required; but, if the experiment at Portsmouth was to be taken as evidence of the anxiety of the Admiralty to inquire into the merits of new inventions, he thought in this case an injury had been done to the inventor. There was nothing, he thought, more destructive to the interests of an inventor than an imperfect trial.

Mr. Reed thought it due to the Admiralty to say that the experiment was not initiated by them. They merely gave permission to Mr. Daft to put down some plates prepared on his system, but they were in no way pledged to go on with the experiments. At the same time, having gone to the extent they did, it might have been desirable that they should have continued the experiments further. He merely wished to say that the Admiralty did not initiate the experiments and then suddenly drop them.

The Chairman said that altered the case in some respects; but he maintained that even the sanctioning of experiments implied, he thought, a continuation of them; those who were practically acquainted with the difficulties appertaining to the introduction of inventions, would appreciate more than official personages could possibly do, the great hindrance caused by incomplete experiments to the progress of an invention. If the intervention of the Government were entirely refused, the inventor was free to act as he pleased; but from the moment he placed his invention in the hands of the Government, he was practically shut out from the public until a verdict upon it had been pronounced. He thought the Government might spend a few thousands a year very well in making really serious experiments upon questions of this nature. Even if such an invention as this were tried upon a merchant ship it would be no convincing proof to the Government of its merit. The Government must make its own experiments to determine its value. With regard to the mechanical mode of joining the plates, he thought it sufficient for this invention if it was admitted that there was no inconvenience thus caused. He did not think any great weight was to be attached to the question of the buckling of the plates; if the back-strap was carefully put on, there would be no fear of fracture unless, as mentioned by Mr. Reed, the back-strap had the fibre in the wrong direction. He thought Mr. Mackie had brought the whole subject very ably and fairly before them, and he was sure they could do no less than give him their thanks for having done so.

The vote of thanks was then passed.

Fine Arts.

Art at the Paris Exhibition.—The competition in sculpture will be between France and Italy, each of which nations is remarkably well represented. The art of sculpture, however, from several causes, scarcely tells with the same effect in the Paris Exhibition as in the London. In 1862 the history of English sculpture was traced back to Chantrey, Flaxman, Bacon, and Banks, and the number of works exhibited amounted to 300. The difficulty and danger of transit may, in some measure, account for the fact that there are now not fifty pieces of English sculpture in the Paris building. The United States send Miss Hosmer's "Sleeping Faun," which acquired renown in the Dublin Exhibition. Italy again produces Magni's "Reading Girl;" also Miglioretti's "Charlotte Corday," a figure which appeared in the Royal Academy of last year. These and other like works are striking examples of the realistic school for which Milan has long been famous; the detail is minute; flowers, delicately and elaborately wrought, give decoration; and other accessories, such as the rush-woven bottoms of chairs, are faithfully rendered in marble. This realistic school, which never fails to attract the multitude, obtains impressive results in the studiously wrought figure by Vela, "The last days of Napoleon I." There is in this work a mental expression which in decorative schools is often wanting. Artizans will do well to study this manner of Milan, which has, in some measure,

grown out of the vast and long-continued demand for decorative sculpture for the cathedral. The style, it may be observed, is the reverse of severe and architectonic, and it has nothing of the Gothic or mediæval element. The Gothic of Milan Cathedral was due to a German; Italian sculptors are so much committed to Canova that they do not readily submit to northern styles. The architectural screen which leads to the Italian courts should be noted by the decorative artist, as a summary of the Italian *cinque cento*. The three sister arts of architecture, sculpture, and painting are here associated after the manner of that epoch. The screen, or *façade*, is built up of columns, pilasters, friezes, cornices, &c.; statues occupy the niches; arabesques, both pictorial and bas-relief, run up the panels; the designs are derived from churches in Lombardy and the "Loggie" of Raphael. A *façade*, less decorative but yet cognate in style, has been put up by Prussia, which is fitting in a nation still swayed by the Renaissance. The Roman sculpture court is not likely to make a display equal to 1862, when it formed a marked attraction. It contains, however, a grand group by Luccardi, professor in the Academy of St. Luke, "An Episode of the Deluge," which serves as a striking example of the modern Roman school. There is none of the repulsive horror which a French sculptor has thrown into an analogous composition. The sentiment is softened by beauty; the execution has delicacy; the composition, too, has been nicely balanced. Tenerani, a venerable leader in the Roman school, is absent; the "Angel of the Resurrection," or "The Swooning Psyche," would have been welcome. The number of English sculptors resident in Rome who swell the contents of the Pontifical collection is less than in 1862; works, however, by Mr. John Adams and Mrs. Chomeley, may be noted; by the latter is exhibited an impressive head of Liszt, inspired by the portraits of Dante. It does not appear that the territories newly acquired by the kingdom of Italy have added materially to the picture and sculpture galleries. One painting comes from Venice, and a bust from Naples. Dupré, of Florence, as usual, asserts his individuality; his "Pietà," and a bas-relief, "The Triumph of the Cross," have an originality seldom found in the treatment of Christian subjects. Dupré, as the name implies, has more in common with French sculptors than Italian. The student, by a little attention, will not find it difficult, in the numerous works collected, to distinguish the schools into which modern Italian sculpture is divided. It will be well to remember that all spring alike from the Greek and ancient Roman; that the influence of Canova is for the most part patent everywhere, save when, by chance, a little naturalism has crept in. Beauty, imagination, delicacy of handling, with attendant weakness, characterize Italian styles.

Collected Works of M. Ingres.—The exhibition of the pictures and studies of this great French artist already referred to, has been, within a short time, opened in the Imperial School of Fine Arts, Paris. The artist's family and friends, and Government authorities in the departments, have combined to make the collection as complete as possible. Some important works, such as "The Apotheosis of Napoleon I.," are wanting, yet the selection made is sufficiently varied and thorough to enable the student to form a correct judgment of the artist's talents and style. Ingres was the representative of a distinctive school, and, as such, his works are specially instructive. He commenced as a pupil in the cold, classic, and statuesque manner of David, from which, however, he freed himself, even in his earliest works, executed at the commencement of the present century. Ingres soon transferred his allegiance to the Italian Renaissance at its point of culmination under Raphael. The works which now in Paris best represent this aspect of high art are "The Apotheosis of Homer," and "The Martyrdom of St. Symphorien." The style is directly Roman and not Venetian. Form, severe and hard, is dominant over colour; and the reflected lights and tones which the Venetians wrought into harmonies almost decorative in brilliancy, were by Ingres ignored as facts in nature. The artist was also known in the spheres of imagination and portraiture; "Ruggiero delivering Angelica," "Œdipus explaining the Enigma of the Sphinx," "The Odalisque," and "Cherubini crowned by the Muse of Music," have long gained a European reputation. To professional painters, the very numerous studies are specially instructive. They are after the manner of Raphael and the great Italian masters. Each figure, every piece of drapery, is wrought from nature; and figures draped in the ultimate composition are often, in the first place, drawn as studies in anatomy. It may be also added that this collection is of the greater interest because it can never be repeated. The high historic school, of which Ingres was among his contemporaries the last representative, has given place in France, as in England, to styles of a more popular character. The opposing school of the colourists, under Delacroix, gained supremacy. But though few artists will now venture on methods fallen into disrepute, no one can study the works of Ingres without profit. They teach the value of form, and expression through form. In London, in 1862, the painter was represented by a picture which excited much attention—"La Source." The proceeds of the present exhibition will be devoted to the promotion of art.

Manufactures.

Household Boiler Explosions.—It is mentioned in one of the reports of the Manchester Association that six explosions happened during the frost in the month of January to boilers in household use, and set in the greater number of cases in kitchens. In most instances these explosions were attended with fatal results, there having been five persons killed, and four injured. Considering the number of these explosions, as well as their fatality, the subject appears to be one of much importance, especially (says the report) since those most exposed to injury are domestic servants, totally ignorant of the danger incurred, and so many of them appear to suffer from these explosions on the recurrence of every frost, and will, it is feared, continue to do so as long as the present construction of these boilers continues unaltered. It is reported that all the exploded boilers just referred to were on the circulating system, and it is thought that the construction generally adopted affords an easy explanation of the frequency of their explosion. These circulating boilers are for the most part constructed with an overhead cistern connected to them by means of two pipes, so that when the fire is lighted the steam and heated water rise through one of these pipes, and the colder water, from its superior gravity, descends through the other, and thus a regular circulation is set up, which continues as long as the pipes are free, the supply of water kept up, and the fire burning. No arrangement can be safer as long as these conditions are complied with. The surplus steam finds a free escape from the overhead cistern, while the two open columns of water form two natural safety-valves to the boiler, and entirely forbid any pressure within it beyond that due by gravity to their height, so that there is no more pressure within the boiler when the fires are burning, however brightly, than when the water is quite cold. It will readily be seen, however, that if the thoroughfare through the two connecting pipes were at any time to become closed, the conditions would be altogether altered, and, the steam having no longer any outlet, the pressure would inevitably accumulate within the pipes and boiler. This is just what takes place on the occurrence of a frost. The circulating pipes become choked with ice, when the pressure is bottled up within the boiler, so that if the fire burns brightly enough to raise the pressure to the ultimate strength of the plates, explosion must necessarily ensue, and the more hot water contained in the boiler, the greater its force. These explosions, therefore, are attri-

buted simply to excessive pressure, and to prevent this it is recommended that every boiler should have fixed to it a metallic safety-valve, which, being unaffected by changes of temperature, would come to the rescue when frost sealed the other outlets. It may be added that should the water supply at any time run short, whether from frost or from being suddenly cut off by the water company, it might be well to withdraw the fire before the boiler can be run dry and overheated, not that it is thought that such serious consequences would result from the sudden re-introduction of the water, as it is very generally supposed, but the boiler, if heated, might be seriously strained and injured, although it is questioned if it would be destroyed. It may easily be ascertained whether the boiler is supplied with water or not, by opening a test tap on the circulating pipes.

Commerce.

Beet Sugar in the United States.—It appears by a New York paper that the cultivation of the beet for sugar purposes in the United States has been commenced at Chatsworth, in Livingston County, Illinois. The company which took the matter in hand planted 400 acres, mostly fresh prairie, and raised a crop of 4,000 tons of fine beet, at a cost of 4 dollars a ton in the pits. The varieties were the white Silesian and the Imperial, and upon a test of various parts of the crop the average yield of fair refining sugar was found to be 7½ per cent., and this was afterwards confirmed by analysis made at Belcher's sugar refinery, St. Louis. A number of barrels have been made, and the works are now in operation and when all the roots are worked up, the yield must reach nearly 400,000 lbs. of refined sugar. There is always delay in starting new works and machinery, but this delay has been of use in settling the question whether beetroot can be kept in America during the autumn and winter. It is found that the loss during the four months was only 1 per cent., and the conclusion of this vast experiment is, that beetroot can be grown on the raw but rich soil of the West, as well as on the highly fertilised soils of Belgium and France; that the yield of sugar is almost precisely the same, and that the roots can be kept till they are wanted. The importance of these facts can scarcely be over-estimated, for the prairie region is equal in extent to England, France, Spain, and Portugal combined, and on almost every acre the beet can be cultivated; while underlying the soil are inexhaustible beds of coal, and the Western people are fully competent to enter upon this new enterprise with energy. A beet sugar crop on these prairies will be of greater value than the corn crop, so that the importance of the successful issue of this experiment cannot be overrated. England and the United States were the only two great consuming countries of cane sugar left in the temperate zone, the continent of Europe being almost entirely supplied by the beet. A sixth part of England's consumption last year was drawn from the beet, and although she has not yet made sugar from it, the plant grows luxuriantly throughout the land. The supremacy of cane sugar in the States is now threatened, and it is perfectly evident that the only hope of cane planters is in improved machinery, and not in vain hopes of higher prices. With proper machinery and cultivation they need have no fear, but these neglected conditions are now essentials.

Colonies.

Statistics of Nova Scotia.—The following information has been kindly forwarded by a correspondent:—The area of Nova Scotia comprises 13,530,237 acres, of which 6,214,944 have been granted, while 7,315,293 are in the hands of the Crown. About one-fifth of the latter quantity is supposed to be fit for cultivation. The population is estimated at 370,560. The annual death-rate is 20 in 1,000. Of the deaths registered in 1866, the causes are thus specified in the following cases:—Tubercular consumption, 22 per cent.; old age, 8 per cent.; diphtheria, diarrhœa and dysentery, typhus and infantile fevers, 4 per cent. each. Eighteen out of 100 deaths were beyond the 70th, and nine out of 100 beyond the 80th year. There were five suicides last year, and four murders. The cases of violent death amounted to 181, 76 of which occurred by drowning. The revenue for the year ending Sept. 30, 1866, was 2,080,180 dollars; the expenditure, 1,961,340 dollars. The imports of the year amounted to 14,381,008 dollars; the exports to 8,043,095 dols. Principal items of export:—Horned cattle, 4,339; sheep and lambs, 10,142; butter and lard, 723,167lbs.; cheese, 17,404lbs.; coal, 399,709 tons; codfish, 33,561,284lbs.; scalefish, 5,114,984lbs.; herrings, &c., 154,560 barrels; mackarel and shad, 100,385 barrels; apples, pears, &c., 19,203 barrels; gypsum, lime, and plaster, 74,892 tons; fish-oil, 192,137 gallons; vegetables, 2,172,450 bushels; boards (plank), 56,832,725 feet; firewood and lathwood, 39,482 cords; laths and palings, 801,800; shingles, 14,058,450; staves, hoops, &c., 3,966,114. The number of registered vessels is 3,509; tonnage, 400,895 tons. The number of tons of coals raised during the year was 684,685, the royalty on which amounted to 52,840 dollars. The gold mines produced 24,162 ounces of gold, value 483,240 dollars. The number of passengers conveyed on the railways was 149,533. There are two lines of railway open, from Halifax to West River, 81 miles, which will be completed to Picton, 19 miles further, shortly, and from Halifax to Windsor, 45 miles. Another line, from Windsor to Annapolis, 80 miles, is commenced. The total number of letters mailed last year was 4,863,845; number of newspapers, 5,390,155. The greatest degree of heat at Halifax was 87·5; the greatest degree of cold, 15·7. Eight years ago the Provincial Hospital for the Insane was opened; number of patients admitted, 417; recovered, 154; relieved, 38; unimproved, 15; died 53; remaining, December 31st last, 157.

Victorian Finance.—The treasurer has been able to state that though the revenue for 1866 had fallen considerably below his expectations, the savings on the votes of the year had been proportionately large. The total receipts were £3,322,887, a sum which met the expenditure, and left a balance of £1,108 to be carried to the service of 1867. He estimated the total revenue for the current year at £3,380,186, and the expenditure at £3,379,078, leaving a surplus of only £242. The estimates contain a great variety of works, but not any of great importance. The Treasurer put it to Parliament, however, that it was better to meet this large expenditure by fresh taxation, than to postpone useful public works. The additional revenue necessary to meet this large public expenditure he proposed to raise by an increase in the duties upon imports, and by adding to the list of dutiable goods many articles hitherto exempt.

Obituary.

Sir Robert Smirke, R.A., a distinguished architect, died on Thursday, the 18th instant, at the age of 87. His father was an eminent artist, who, in his day, enjoyed a considerable reputation as a historical painter, and his two sons, Robert and Sydney, both obtained high distinction as architects. Robert studied for some time in the office of Sir John Soane, and subsequently spent several years in Italy, Sicily, and Greece. He was elected a Royal Academician in 1813, and in 1823 was entrusted with the building of the British Museum, and shortly after with the new Post-Office; these, and the restoration of York Minster after its destruction by fire, in 1829, being among the best known of his public works; Lowther and Eastnor Castles are among the best

specimens of private mansions built by him. Having been many years architect to the old Board of Works, he was knighted in recognition of his services, when, in 1831, that Board was reconstituted. For a short time he held the office of treasurer to the Royal Academy, but relinquished that appointment on going to reside at Cheltenham in 1850; and a few years ago, finding his declining health materially interfering with the efficient discharge of the duties of a Royal Academician, he resigned its honours that they might be conferred upon a younger and more active man. Sir Robert Smirke, in 1819, married a daughter of the Rev. A. Freston, rector of Edgeworth, in Gloucestershire.

MEETINGS FOR THE ENSUING WEEK.

Mon.....R. United Service Inst., 8½. Commander P. H. Colomb, R.N., "Lessons from Lissa."
British Architects, 8.
Actuaries, 7. Mr. W. M. Makeham, "On the Law of Mortality."
Medical, 8.
Asiatic, 3.
Social Science Assoc., 8. General Meeting of Health Department.
Philosophical Club, 6. Annual Meeting.

Tues ...Royal Inst., 3. Prof. Blackie, "Plato."
Antiquaries, 2. Annual Meeting.
Civil Engineers, 8. Discussion upon Colonel Sir William Denison's paper on "The Suez Canal;" and, time permitting, Mr. James T. Chance, "On Optical Apparatus used in Lighthouses."
Anthropological, 8.

Wed ...Royal Inst., 2. Annual Meeting.
Society of Arts, 8. Mr. J. Pratt, "On a Machine for Typewriting."
Obstetrical, 8.
R. United Service Inst., 8½. Capt. Cowper P. Coles, R.N., "The Turret *v.* the Broadside System.

Thur ...Linnæan, 8. Mr. John Miers, "On Crescentieæ."
Chemical, 8.
Royal Society Club, 6.
Royal Inst., 3. Prof. Huxley, "Ethnology."
Artists and Amateurs, 8.
Royal, 8½.

Fri .....Royal Inst., 8. Prof. Blackie, "Music of Speech in Greek and Latin."
Philological, 8.
Archæological Inst., 4.

Sat .....R. Botanic, 3¾.
Royal Inst., 3. Prof. Huxley, "Ethnology."

Patents.

From Commissioners of Patents' Journal, April 19th.

Grants of Provisional Protection.

Bells, steel—940—B. Farmer and T. Balmforth.
Boilers—1003—W. Stafford and W. P. McCallum.
Boilers, &c.—988—W. Clark.
Bottles—1033—W. Dennis.
Bottles, &c.—916—N. Thompson.
Boxes—978—W. R. Lake.
Bricks, &c.—954—W. Clark.
Bridges, suspension—994—A. S. Hallidie.
Bridles—1001—A. G. Hills.
Brooms—958—H. A. Bonneville.
Carriages, hoods for—945—J. Macnee.
Cartridges, &c.—989—J. F. Reeves.
Cigars—969—J. Prentice.
Coal, &c., machinery for getting—964—J. G. Jones.
Copying-press—986—W. Clark.
Designs upon paper, producing—947—W. B. Woodbury and R. H. Ashton.
Engine, hydraulic—953—W. E. Newton.
Engines, locomotive—977—J. J. and A. Meyer.
Fire-arms—962—F. J. Manceaux.
Fire-arms, breech-loading—961—F. Hahn.
Fire-arms, breech-loading—963—J. Whitworth.
Fire-arms, breech-loading—1007—W. R. Lake.
Fire-arms, breech-loading—1023—W. A. Gilbee.
Fire-bars—906—J. Grundy.
Flax, &c., preparing—841—J. Spencer.
Flax, &c., preparing—948—R. H. Collyer.
Flowers, &c., artificial—981—T. B. Robinson.
Fluids for illuminating purposes—965—C. D. Abel.
Fuel, means of readily igniting—974—H. A. Bonneville.
Furnaces—944—T. Prideaux.
Gas—819—J. Greenshields.
Gunpowder—960—F. Hahn.
Hats—942—J. E. Ward.
Horses, &c., apparatus for clipping—982—J. Shanks.
Iron, &c., smelting—922—E. H. Aydon and E. Field.
Looms—987—W. Clark.
Looms—991—J. Whitehurst and T. Walsh.
Looms—1011—E. Pilling and J. Harper.
Looms—1017—D. Ellison.
Looms—1031—R. Neild, T. Smith, and J. Yates.
Metallic plates—949—J. Fleming.
Metals, ornamentation of—932—G. Davies.
Motive-power machinery—1059—H. Forbes.
Mowing machines—918—J. Howard and E. T. Bousfield.
Needles—999—J. W. Scott.
Oil cake presses—967—J. Harker.
Paper, &c., machines—914—W. Wood.
Petroleum, &c., utilizing heating properties of—930—A. Barff and J. Kidd.
Pictures, opalline—955—G. Higginson.
Pocket-books, &c.—3429—G. Haseltine.
Printing surfaces in relief or in intaglio—968—C. E. Brooman.
Pump, rotary—833—J. H. Winder.
Pumps—1027—W. Adair.
Rowing apparatus—943—E. S. Jones.
Safety-lamps—992—E. H. Waldenström.
Scale-board—1051—W. Clark.
Sewing machines—970—A. V. Newton.
Sewing machines—1057—W. N. Wilson.
Ships, apparatus for propelling—1039—W. W. Hughes.
Ships' lights—966—W. R. Lake.
Signals, railway—879—J. S. Morton.
Signals, railway—950—S. Lilley.
Signals, railway—959—J. Randall and C. Adams.
Signals, railway—1021—J. G. Tatters.
Spoons, forks, &c.—1055—D. J. Fleetwood.
Stables, &c., fittings for—993—J. Musgrave.
Stirrups—912—W. Clark.
Stoves—936—E. W. Ball.
Sugar machines—980—W. E. Newton.
Tanning machines—920—W. R. Lake.
Taps—928—E. Canton.
Taps, &c.—1037—G. Stuart.
Telegraph cables, apparatus for laying—1015—J. M. Kilner.
Telegraph wires, coupling—951—J. J. McComb.
Telegraphs—908—C. D. Abel.
Telegraphs, submarine—1053—G. Little.
Travelling bags—1041—J. Drew, E. Southwell, and H. White.
Umbrellas, &c.—926—J. A. Simpson.
Valves—1029—H. Wilson.
Ventilators—941—R. Canham and F. W. Kreut.
Water-closets—597—W. E. Gedge.
Water-meter and force-pump—1045—W. R. Lake.
Wool, &c., preparing—946—S. M. Grover.
Wool, &c., spinning—1009—J. Ladley.
Wool, &c., washing—1013—J. Petrie.
Woollen yarns, apparatus for covering with an outer thread—1047—G. F. James.
Yarn, &c., manufacture of—938—W. Bywater.
Yarns, preparing—934—W. Wood.
Yarns, twisting—910—F. N. Taylor and J. Lodge.
Zinc, separating from certain minerals—997—P. Spence.

Patents Sealed.

2729. R. T. Williams.	2748. H. S. Coleman and A. G. E. Morton.
2732. A. Field.	2749. J. C. Stevenson.
2742. E. Mignot.	2750. F. Taylor.
2745. H. D. Plimsoll, J. B. Davies, and W. R. Dawson.	2823. W. Clark.
2746. C. E. Brooman.	2909. G. Shaw.
2747. Sir E. F. Piers.	2968. J. Harding.
	981. E. Walton.

From Commissioners of Patents' Journal, April 23rd.

Patents on which the Stamp Duty of £50 has been Paid.

966. G. Haseltine.	990. A. C. Fraser.
974. G. Davies.	996. H. Wadkin.
1032. J. J. Smyth.	1008. A. Leighton.
1055. J. White.	1017. G. F. Harrington.
1081. R. A. Brooman.	1018. J. Thompson.

Patents on which the Stamp Duty of £100 has been Paid.

974. J. Fowler, W. Worby, and D. Greig.	1020. D. G. Berri.
	1042. J. G. West.

Registered Designs.

4852—April 5th—Magic lantern—Jas. Parkes and Sons, Birmingham.
4853—April 12th—Tourist's desk—T. Drayton, 1, Holford-square, E.C.
4854—April 16th—A bucket—T. Whitfield and Co. Birmingham.
4855—April 17th—A brace link—Martin and Harris, Birmingham.
4856—April 24th—Design for the prevention of smoke in furnaces—J. Hatton, 75, King-street, Coventry.

Journal of the Society of Arts.

FRIDAY, MAY 3, 1867.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'Clock :—

May 8.—"On the Recent Inventions and Improvements in European and American Breech-loading Small-arms." By Capt. O'Hea, late 25th Regt. K.O.B.

May 15.—"On New Machinery for Cutting, Tunnelling, Quarrying, and Facing Slate, Stone, and Marbles." By W. Fothergill Cooke, Esq.

Cantor Lectures.

The concluding lecture of Mr. Hullah's course, "On Music and Musical Instruments," will be delivered as follows :—

Lecture VIII.—Monday, May 6.

Modern Instruments, Chamber and Orchestral.—The Pianoforte—Combination of Instruments—The Orchestra.

The concluding lectures of Mr. Chaffers' course, "On Pottery and Porcelain," will be delivered as follows :—

Lecture VI.—Monday, May 13th.

English Pottery.—Fulham—Lambeth—Yorkshire—Shropshire—Liverpool—Staffordshire—Etruria—Wedgwood's Wares, &c.

Lecture VII.—Monday, May 20th.

English Porcelain.—Bow—Chelsea—Derby—Worcester—Liverpool—Wales—Plymouth—Bristol—Lowestoft—and other Manufactories—Battersea Enamel, &c.

The lectures commence at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend.

Conversazione.

The Council have arranged for a Conversazione on Thursday evening, the 23rd May, at the South Kensington Museum, cards for which will shortly be issued.

Artizans' Visits to Paris.

The Council of the Society of Arts, feeling the importance of promoting the intelligent study of the Paris Exhibition and the manufacturing establishments in France by artisans of the United Kingdom, have appointed a Committee in furtherance of this object. The following gentlemen constitute the Committee :—

Rt. Hon. C. B. Adderley, M.P.
C. W. Aitken.
Edward Akroyd, M.P., *Vice-Pres.*
Sir Wm. G. Armstrong, C.B.
A. S. Ayrton, M.P.
S. A. Beaumont.
John Bell, *Memb. of Council.*
Professor Bentley, *Memb. of Council.*
Lord Berners, *Vice-Pres.*
Hon. and Rev. S. Best.
D. Roberton Blaine, *Memb. of Council.*
W. H. Bodkin (Assistant-Judge), *Vice-Pres.*
Sir J. P. Boileau, Bart., *Vice-Pres.*
R. K. Bowley.
Antonio Brady.
Rt. Hon. H. A. Bruce, M.P.
Decimus Burton.
C. Buxton, M.P.
The Earl of Caithness, *Vice-Pres.*
Lord Eustace Cecil, M.P.
R. L. Chance.
Harry Chester, *Vice-Pres.*
The Masters of the City Companies.
Henry Cole, C.B., *Vice-Pres.*
Robt. Coningsby.
Rt. Hon. W. Cowper, M.P.
Sir Francis Crossley, Bart., M.P.
J. Bailey Denton, *Memb. of Council.*
Lord de l'Isle and Dudley, *Vice-Pres.*
The Duke of Devonshire.
Charles Dickens.
James Easton, *Memb. of Council.*
C. W. Eborall.
Lord Ebury.
Lord Elcho, M.P.
William Fairbairn, F.R.S.
Professor Fawcett, M.P.
Peter Graham, *Memb. of Council.*
The Earl Granville, K.G., F.R.S., *Vice-Pres.*
The Earl Grosvenor.
Mr. Hansard.
G. W. Hastings.
Wm. Hawes, F.G.S., *Vice-Pres.*
J. Pope Hennessy.
Sir Rowland Hill, K.C.B.
Chandos Wren Hoskyns, *Vice-Pres.*
T. Hughes, M.P.
Blanchard Jerrold.
Rev. C. Kingsley.
Hon. A. F. Kinnaird, M.P.
Lord Henry G. Lennox, M.P., *Vice-Pres.*
The Bishop of London.
The Sheriffs of London and Middlesex.
Rt. Hon. Robt. Lowe, M.P.
Lord Lyttelton, *Vice-Pres.*
Archbishop Manning.
Henry Maudslay, *Memb. of Council.*
Rev. F. D. Maurice.
The Lord Mayor.
J. Stuart Mill, M.P.
Rev. Dr. Miller.
The Bishop of Oxford.
J. Slaney Pakington, *Memb. of Council.*
Right Hon. Sir John S. Pakington, Bart., M.P., *Vice-Pres.*
Alderman Sir B. S. Phillips.
Sir Thomas Phillips, Q.C., F.G.S., *Vice-Pres., Chairman of the Council.*
The Duke of Richmond.
Rev. W. Rogers.
The Marquis of Salisbury, K.G., *Vice-Pres.*
Titus Salt.
Sir Francis Sandford, *Vice-Pres.*
Colonel Scott, R.E., *Memb. of Council.*
The Earl of Shaftesbury.
Benjamin Shaw, *Memb. of Council.*
Sir J. P. Kay Shuttleworth, Bart., *Vice-Pres.*
S. Smiles.
Seymour Teulon, *Treasurer.*
Thomas Twining, *Vice-Pres.*
Alderman Waterlow, *Memb. of Council.*
E. W. Watkin, M.P.
G. Watts.
George F. Wilson, F.R.S., *Memb. of Council.*
Vice-Chancellor Sir Wm. Page Wood, F.R.S., *Vice-Pres.*

The Council, on the recommendation of the Committee, have passed the following minute :—

At the last and former International Exhibitions held in this country, arrangements were made by the French Government to facilitate the visits of skilled artizans, and interesting reports on the exhibitions were made by them to their government. Believing that such visits on the part of skilled workmen to these great international displays not only exercise a beneficial influence upon the men themselves, but also upon the progress of industry in the country to which they belong, the Council of the Society of Arts have resolved to raise a fund to be employed in aiding a limited number of English workmen to proceed to Paris for the purpose of studying the present French Exhibition.

To carry this object into effect, they have agreed on the following plan :—

1st. That a number of selected workmen (the number to depend on the amount of funds at the disposal of the Council) shall be assisted to proceed to and remain in Paris a sufficient time (say three weeks), for the purpose of making a careful study of the exhibition, and of such factories and workshops as they may desire to visit.

2nd. That every man so assisted shall, on his return, make a report to the Society of what he has observed during his stay, in reference to the special industry in which he is engaged, and that it be made a condition of the grant to each man that one-third of the amount be retained until his report shall be supplied to the Society.

3rd. The Council think it will be undesirable to fix the exact time for, or to prescribe the duration of, these visits, or to interfere with any of the arrangements the men may desire to make for their own accommodation; but, in order that they may take advantage of the facilities provided by the Commission organised by the French Government for the study of the exhibition, the men will be placed in communication with that Commission on their arrival in Paris.

4th. A considerable sum will be required satisfactorily to accomplish the important object undertaken by the Society, and, in order to raise these funds, the Council have determined to appeal to the members of the Society, who must be interested in the successful results of this movement, in the belief that they will not hesitate to join in a subscription for the furtherance of the undertaking; and they propose at the same time to communicate with the various Chambers of Commerce, inviting their counsel and support. The Council have decided to commence the subscription by a vote of one hundred guineas from the funds of the Society.

The following report has been made by the Secretary:—

To the Council of the Society for the Encouragement of Arts, Manufactures, and Commerce.

Gentlemen,—In compliance with the directions of the Council, I proceeded to Paris for the purpose of ascertaining what arrangements were likely to be available with regard to the lodging and boarding of such artizans as might visit Paris under the auspices of the Society.

I soon found, from inquiries made in various quarters, that little information of any value, as to the probable cost of private lodgings generally, or as to what lodgings would probably be available, was likely to be obtained; indeed, any figures or statements under this head at that time were not likely to be of any use, or in any way to be a guide to the deliberations of the Committee.

The prices asked at that time were exceptionally high, but there was every reason to believe that a reaction would take place, and that, after the exhibition had been open a short time, these prices would diminish.

Mr. Cook, the well-known excursionist, I found was prepared to contract for the lodging and boarding of 50 artizans per week, supplying two substantial meat meals per diem, for 5s. per head per day. I subsequently placed myself in communication with M. Le Play, the General Commissioner of the Exhibition, who informed me that a Special Commission had been formed, under a ministerial decree, for effecting the very objects I was in search of, and he gave me a special letter of introduction to the Chairman of that Commission, Mons. Devinck, formerly President of the Tribunal of Commerce for the Department of the Seine, and I had two interviews with that gentleman. It appears that the object of this Commission is to raise, by subscription or otherwise, funds for facilitating the visits to the exhibition of foremen, workmen, or labourers connected with industrial and agricultural pursuits, and for enabling them to study the exhibition in all its aspects.

The Commission proposes to raise a fund (to which the Emperor and Empress have subscribed largely) in order to provide lodging and board at a cheap rate for artizans, to assist workpeople in their travelling to and from Paris, and to supply gratuitously medical aid in case of sickness. Mons. Devinck informed me that the Commission expected to have under their control five thousand beds. These are situated in different parts of Paris and the outskirts. They have had placed at their disposal large buildings and barracks, and some of a temporary character have been specially erected in the neighbourhood of the exhibition, which will be furnished suitably for the purpose, and beds will be arranged in the rooms, four and upwards in each room. In one of the buildings it is said that several hundred beds will be placed in one room.

Arrangements are made for breakfasts and dinners on a large scale and at a cheap rate, in a building erected for the purpose, with access to the Champ de Mars, where 1,000 persons can take refreshments at one time.

These arrangements, more especially those for aiding workmen gratuitously in their travelling expenses, were intended for French workmen, but at the same time all the organisation of the Commission is intended to be available for the workmen of other countries.

It is also intended that guides, speaking English and such other languages as may be necessary, shall be provided to conduct the men over such workshops as they may wish to visit. M. Devinck stated that on receiving notice a sufficient time beforehand, the Commission would be prepared to provide lodging for such men as might be sent over and recommended to their consideration by the Society of Arts, at a payment of one franc per night per head. Their breakfasts—a substantial meal of meat—and dinners would be obtainable in the building I have before named, at one franc per head for each meal.—I am, &c.,

P. Le Neve Foster, Secretary.

P.S.—Since writing the above, I have received the following tariff of prices at the restaurant referred to in my letter:—

Grand Restaurant Omnibus, Parc de l'Exposition (Avenue Lamotte-Piquet).

Prix des objets de consommation.

Pain	0fr.	10c.
Vin, le carafon	0	15
Bière, la chope	0	25
Bouillon	0	15
Potage	0	20
Bœuf	0	25
Légumes	0	20
Fromage	0	15
Café avec eau-de-vie	0	30
Roti *avec légumes*	0	40

On peut demander un seul des objets de consommation ci-dessus mentionnés.

Le consommateur, en apportant son pain, peut se procurer pour 0fr. 40c. l'*ordinaire* (bouillon et bœuf).

Members are invited to aid the Council in this undertaking by subscriptions, which should be forwarded to the Financial Officer at the Society's house.

The Council have received offers of co-operation from a Committee for promoting cheap excursions to the Exhibition, formed under the auspices of the "Working Men's Club and Institute Union," and of which Mr. A. H. Layard, M.P., is President, and Mr. Hodgson Pratt, Vice-President. This Committee has issued a notice to the effect that working-men may travel "to Paris and back, with one week's lodging," for 30s., or "with meat breakfast and superior bed accommodation," 44s. 6d. They estimate the total expense of stay (for one week), journey, and Exhibition ticket, at £3. Registration tickets, and every information relative to these excursions may be obtained from the Secretary, Mr. W. O. Pocklington, at 150, Strand, and at various Working Men's Clubs and Institutes.

Harvesting of Corn in Wet Weather.

The Council of the Society of Arts have resolved to offer the Gold Medal of the Society, and a Prize of Fifty Guineas, for the best Essay on the Harvesting of Corn in Wet Seasons.

The first part of such essay—after noticing the various systems at present adopted in damp climates for counteracting the effects of moisture upon cut corn in the field, and for avoiding such exposure in wet seasons by peculiar harvesting processes—should furnish a practical and analytic exposition of the best available means:—

1st. Whereby cut corn may be protected from rain in the field.
2nd. Whereby standing corn may, in wet seasons, be cut and carried, for drying by artificial process.
3rd. Whereby corn so harvested may be dried by means of ventilation, hot air, or other methods; with suggestions for the storage both in the ear and after threshing.
4th. Whereby corn, sprouted, or otherwise injured, by wet, may be best treated for grinding or feeding purposes.

The whole to be supplemented by a statement of practical results, and actual cost of each system described; and authenticated estimates of any process proposed for adoption, based upon existing but incomplete experiments.

The above requisitions are given suggestively; not to bind the writer to the order or to limit the treatment of the subject, provided it be kept within the scope of practical experience and utility.

The essays must be sent in to the Secretary of the Society of Arts on or before the 1st of January, 1868.

The Council reserve the power to withhold the whole or part of the prize, in the event of no essay being, in the opinion of the judges, of sufficient merit.

Subscriptions.

The Lady-day subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Food Committee.

A meeting of the Sub-Committee on Meat was held on the 3rd ult., at which there were present—The Right Hon. Henry Austin Bruce, M.P., in the chair; Mr. Clare S. Read, M.P., Mr. Benjamin Shaw, Mr. Michael, Mr. J. Ludford White, Mr. Jas. Ware, Professor John Wilson, and Mr. E. Wilson.

Dr. Alfred S. Taylor attended the Committee, on the invitation of Mr. Benjamin Shaw, and he brought for the inspection of the Committee a tin case of preserved provisions which had formed part of the stores of H.M.S. *Blonde*, in the year 1826. The tin was opened in the presence of the Committee. An account of its condition, drawn up by Dr. Taylor, will be found at the conclusion of his evidence.

Dr. Taylor, in reply to inquiries put by the Committee, stated he was not aware of the precise method by which this specimen of provisions just opened had been preserved. It had no doubt been preserved by raising the meat in the tin to a somewhat high temperature, obtained by immersing the tin in a bath of boiling brine, and hermetically sealing the tin by means of solder whilst the steam was rushing out, and thus preserving the contents in vacuo. The process was the same as that now in use, though probably not effected at that time with the same care which is now used. The necessity for the perfect exclusion of air from the meat was shown in the instance before them by the rapidly oxydising effects of the air upon the contents of the tin. In a few hours decomposition would take place. Allowance, however, was to be made for the extreme length of time that had elapsed. There were certain points to which attention must be paid in connection with the artificial preservation of meat. His investigations had been directed in the first instance to the circumstances connected with the decomposition of animal substances and the best means of preserving meat for the purpose of food. Putrefaction of animal and nitrogenous principles used as food resulted from three primary causes, viz., 1st, air, by supplying oxygen; 2nd, water, or moisture; 3rd, a temperature above 50°. These were the three main conditions. All that need be done in preserving animal matter was to find out which of these conditions could be completely suppressed or put aside. With regard to air, putrefaction was arrested by heating the substance in close vessels, and the exhaustion of the air would be facilitated by the vacuum process by heating at a low temperature, as was done by vacuum pans in the manufacture of sugar. Putrefaction was also arrested in animal substances by gases or vapours which contained no free oxygen—such as nitrogen, carbonic acid, and chloroform, or by the use of gases which combine with and remove free oxygen, such as deutoxide of nitrogen (nitric oxide) and sulphurous acid. The latter, being very soluble, is liable to be absorbed by the flesh, and to act chemically upon the colouring matter, taste, &c. He had tried various experiments in the preservation of slices of beef in nitric oxide, which was very effectual in preventing putrefaction. In the first experiment he kept the meat for eighteen weeks, in a second for nineteen weeks, in a third for thirty-two weeks, and in a fourth for eighteen months, from October 27th, 1862, to March, 1864. During these periods the flesh was exposed to two of the conditions of putrefaction, viz., moisture and high temperature. The summer was very warm. This gas is remarkable in this respect, it will not allow free oxygen to come into contact with it. At the end of the eighteen months the meat retained its red colour and appearance, although it was exposed during the whole time to the varying temperatures of the laboratory. The simple abstraction of the oxygen was sufficient to preserve the meat completely. This process, although not practically applicable for preserving food, was useful in showing that oxygen is the main agent of destruction. Keep that away, and the other two conditions are of no importance. That applied to the preservation of food in tins, from which air was excluded by exhaustion by heat, and also to Redwood's process, in which the substance was imbedded in paraffine. In the latter case the meat was preserved like the flesh of the Egyptian mummies, and the material in which it was enclosed got into the flesh and excluded the oxygen. Then, with regard to moisture. If the water were taken away from the most putrescible matter it could be preserved for a long time. Dr. Taylor produced a specimen of white of egg from which the moisture had been removed in a vacuum, by the aid of dry chloride of calcium. In that way he said the albumen was dried to the gummy matter now presented, forming about one-fifth of the original albumen; but with the addition of four parts of water it could be restored to its original state again. This proved that substances which would putrefy in warm weather in

twenty-four hours, yet if the water were taken away, although there were the conditions of oxygen and high temperature, they would undergo no change. Desiccation might be mentioned as another means resorted to in the preservation of food, as was seen in the instance of the tongues imported into this country from Archangel and other parts of Russia. These were slightly salted, and smoked by being suspended in chimnies over wood fires, and so thoroughly desiccated that they would remain good in warm or cold climates for almost any length of time. Dr. Taylor placed a specimen of a dried Russian tongue before the Committee, and explained that an ox tongue could be detected from that of a horse by the difference in the form of the epiglottis of the two animals. When the epiglottis remained on the tongue it might be inferred whether it was that of an ox or a horse, while the removal of that portion from the tongues imported into this country might create a suspicion that they were the tongues of other animals than the ox. These tongues, Dr. Taylor explained, on being soaked in water for twenty-four or thirty-six hours, regained very nearly the original quantity of moisture of which they had been deprived by desiccation. He learnt from his friend beside him (Dr. Gwosdew, of Moscow, a Russian physician) that with a temperature below 40°, although oxygen and moisture were present in the substance, there was no tendency to decomposition, so that meat buried in the soil below 40° might be kept good for months. This plan was resorted to for preserving provisions in the Arctic expeditions. The provisions were buried in the frozen earth, the positions being indicated by stones placed over them, and after many months they were found to have undergone no change. Dr. Taylor then went on to state the principles to be observed in the preservation of animal food. These were—

1. No chemical compound to be used, with the exception of salt, and that only in small quantity.

He thought the use of salted meat, in the way it was ordinarily understood, was not desirable, because it hardened the meat, and rendered it more or less indigestible, and there were no means by which the chemist could get the salt out again. Salt in large quantity added to the insolubility of the meat. A small quantity of salt was beneficial in the preservation of food, as chloride of sodium added to the other principles tended to prevent the growth of fungi. The next point was—

2. The fleshy portion, drained of blood, to be selected; only those portions to be taken which are in a sound state, and as soon after death and cooling of the body as possible.

The draining away of the blood was a point of great importance, because there was no portion of the body so prone to decomposition as the blood; hence, butchers were careful to drain the blood from the animals they slaughtered as much as possible. It was therefore desirable that the portions of flesh intended for preservation should be entirely free from blood, on account of the albumen it contained, which was easily decomposed. One of the first effects of decomposition was mustiness, which spoilt the taste of food—so that in getting rid of the blood we get rid of matter which was most prone to decomposition. On the point of selecting only those portions which are in a sound state, he would remark that in many instances, there could be no doubt, bad consequences had resulted from placing unsound meat with the sound. It was well known that when animal matter affected by decomposition was placed in contact with fresh matter, it tended to set up decomposition throughout the whole mass. That was a most essential point, which should be considered by those by whom the food was prepared. On the point of the preparation of the flesh as soon after death and cooling of the body as possible—this was desirable on account of animalcula setting up changes in the body which tended to putrefaction. It was therefore desirable that the meat should be preserved as soon after the cooling as possible, to prevent any incipient stage of putrefaction. Microscopic observation detected those incipient changes on the mucous surfaces of the flesh, and that threw light upon the necessity of not allowing this change to begin. The next point was—

3. The portions selected to be partially cooked, *i.e.*, heated to about 170° for a short time, in order to coagulate the liquid albumen.

In the case of some of the artificially preserved meats now in use, Dr. Taylor observed that they were subjected to a temperature of 220° or 240°; that, he believed, was the case in Redwood's process. By that means the meat might be said to be overcooked for the purpose of food. In order to preserve meat for food it was important that the original properties of the meat should be retained as much as possible. The primary object was not to cook the meat entirely, but merely to preserve it. He suggested the heat of 170°, for this reason, that the albumen, which was the most easily decomposable principle in the flesh, was solidified at that temperature without destroying the properties of the meat. He submitted that the temperature which would fix the fluid albumen viz., 170°, was sufficient for preservative purposes, and the fibrine and gelatine were at the same time retained unchanged. The time during which the meat should be subjected to a temperature of over 170° should be regulated according to the size of the joint, but the temperature should not be raised beyond that. When meat was exposed to a heat of 240° for half or three-quarters of an hour, it necessarily followed that the fibrine was hardened or corrugated, and the meat was brought into a condition less easy of digestion, as well as forming less palatable food. In making hashes and minces of meat, if it was allowed to boil at a high temperature for an hour or two, the meat was converted into a hard fibrous material, which was very indigestible, whereas, if it had been maintained at a temperature of not more than about 170°, at a slow simmer, the meat was soft and good. He thought even the temperature of 212° was too high in such cases. Meat preserved at a temperature of 170° or 180°, could be cooked to completion when required, with the addition of a little salt. Meat exposed for any considerable length of time to a temperature of 220° or 240° must be considered as overcooked. The inside of a mutton chop or beef steak when broiled underdone, and in which all the juices of the meat were retained, did not reach the temperature of 170°, but only reached that point at which the blood and albumen contained in the flesh were coagulated. He considered it preferable to subject the meat to be preserved to the lower temperature of 170° for a long period, rather than to the high temperature of 240° for a very short time. With regard to the next point, he said—

4. The meat to be introduced into tins in the usual way, and the whole of the air excluded by partial exhaustion or by heat. The absence of any free oxygen is an essential point.

It occurred to him that the exhaustion of air from the tins might be effected in a very satisfactory manner by the use of vacuum pans, like those employed in the manufacture of sugar, invented by Howard, consisting of two large copper pans in which complete exhaustion was effected. Exhaustion by the air pump could not produce more complete results than was done in reference to the tin case of preserved provisions of 1826, by heating alone. Looking to the large component part which the flesh of animals forms in the food of this country, it occurred to him as a further point—

5. The tongue and heart drained of blood and laid open, and the liver sliced and drained of blood, might be preserved by slight salting, heating to 170°, and then perfect desiccation by drawing over these parts a current of warm air.

These portions of the viscera of animals readily admitted of perfect desiccation, and in that state might be sent to this country from very long distances, and would form an excellent and nutritious article of food. The only thing with regard to the liver was that it contained fatty matter which, in the process of drying, would exude, and probably give a disagreeable appearance to the surface. He had preserved portions of the human liver for years in his laboratory by thorough desiccation. In this mode of preserving food he apprehended the packing in air-tight vessels would not be required. He believed the partial cooking of the meat at the temperature of 170° would to a great extent exclude the air; but he would add exhaustion as a completing process. The next point he would submit was—

6. Either by the entire removal of oxygen, or the entire removal of moisture, the tendency to putrefaction is destroyed and the food is preserved. The desiccated food may have its properties restored by immersion in salt and water for one or two days.

This point, he said, was sufficiently illustrated in the case of soaking dried tongues in water previous to cooking.

7. The process of desiccation will not answer for fat meats, as the fat will appear as oil upon the surface. It may not answer for the sliced liver, but this should be made the subject of experiment.

The membranous portions of fat were apt to become rancid from the albumen becoming decomposed, and produced mustiness. This gave rise to the mustiness that was found in stale suet. There was no objection to fat free from membrane, but it was not desirable to preserve the fat of the heart and tongue. In travelling in Italy he recollected that an excellent dish, consisting of sheeps' hearts stuffed with savoury herbs, &c., was frequently served in the Italian restaurants. It was good and digestible food, as the fibres of the heart were less tough than those of the other muscles of the body. The concluding point he submitted was—

8. In preserving meats it will be desirable to remove as much as possible the blood and also the fat, and to take care that a heat of 170° is attained and not exceeded. The parts only of healthy animals to be selected.

These leading principles in the preservation of food, Dr. Taylor remarked, would, he hoped, be some little help to the Committee in the consideration of this subject.

The Chairman asked Dr. Taylor whether he considered these principles had been more or less disregarded in the methods of preservation hitherto employed.

Dr. Taylor replied that he had not given much attention to the examining of tins of preserved food, but from general scientific knowledge he should say they had been to some extent disregarded. He thought it probable that sufficient care had not been exercised with regard to putting unsound meat with sound; and there was reason to believe that was the case in some of the provisions supplied to the army during the Crimean war, by which the whole contents of the cases were spoiled. It was also to be apprehended that proper means were not always taken to exclude air. The test of complete exhaustion of air was the indentation of the top and bottom of the tin, while the undue convexity of the tin was an indication of the presence of gases generated by decomposition of the animal substance within the tins.

Mr. Shaw, in reference to Dr. Taylor's suggestion that the meat should be prepared at a low temperature, inquired whether he thought Tindal's system was defective in regard to the high temperature employed in his process?

Dr. Taylor replied in the affirmative. The meat was overcooked in the first instance. The object should be to apply no more heat than would suffice for the preservation, and afterwards to apply the cooking. He had no doubt the high temperature employed in Tindal's process was adopted from a belief that it was necessary for the preservation of the food, and from the fact not being generally known that the albumen in meat was coagulated at a temperature of 170°. The excessive temperature of 220° or 240° consolidated the albumen to an extent which made it indigestible. Dr. Taylor did not think that experiments upon Tindal's meat, or other meats preserved in the same way, could be satisfactorily tried by artificial digestion with pepsine, or by giving it to animals and examining the results. If the pepsine, for instance, were taken from the stomach of a sheep, he should object to that being taken at all, the digestive principle of a herbivorous animal differing very greatly from that of a carnivorous animal. There was no doubt that the stomach of a dog would digest the meat with the greatest ease. If the experiment could be tried on human beings it would be preferable. Experiments, however, of a comparative character might be tried, one with the albumen coagulated at the temperature of 170°, and another when it was coagulated at a much higher degree of temperature. It was surprising what the effect was of boiling a piece of beef at a high temperature for a long time; it became hard and fibrous. He did not say it was wholly indigestible by the human stomach, but it was not by far so digestible as meat heated and cooked at a much lower temperature. The object was to obtain that which would suit the stomachs of 99 people out of 100, and in that view he was of opinion that the high temperature employed in Tindal's process was not only unnecessary, but prejudicial to the nutritive properties of the food.

The Chairman asked if a different amount of cooking would be required in meat partially cooked as Dr. Taylor had described.

Dr. Taylor replied it would be in the condition of a joint of meat which was partly cooked on Saturday to keep it good till Monday, when the process of cooking was completed. It would be treated as partially cooked meat. A certain amount of cooking was necessary at the place where the preparation of the meat was carried on—say Australia or South America—but he submitted than an excessive amount of cooking was unnecessary. Tindal's meat was thoroughly cooked, and required to be eaten cold as taken from the tins. Any further heating or cooking on its arrival in this country, he apprehended, would materially affect its flavour and act prejudicially on its nutritive properties, and frequently re-cooked food does not suit the stomach. The partially cooked food he recommended would obviate that. He believed a temperature of 170° entirely excluded air, and the meat was not injured either in its flavour or preservative qualities. Food so prepared would keep good for two or three years. The want of flavour which characterised the meat which he tasted at Mr. Shaw's house was very apparent. It occurred to him that in Tindal's process some of the savoury matters of the meat were volatilised, which probably might be retained at a lower temperature. The effect of excessive boiling or heating of meat to a high temperature had a most prejudicial effect in driving out the nutritive properties and retaining only the indigestible muscle and insoluble fibre of the flesh.

Professor Wilson suggested that if the temperature were not carried above the point of evaporation, or 212 degrees, there would not be so perfect a vacuum as if the atmosphere were replaced by an atmosphere of steam.

Dr. Taylor said no doubt that would be so, but the 170 degrees might be continued for some time without prejudicing the quality of the meat, and the cooking could be completed when it was required for use. That, he thought, would, in a great measure, meet the objection which had been stated by a member of the Committee against the present form of the Australian food. If the system were carried out on a large scale, it would be advisable, in order to exhaust the air from the tins, to adopt the vacuum-pan as used in the manufacture of

sugar, as by this means a vacuum would be obtained without heating to 212 degrees.

The Chairman asked Dr. Taylor whether he thought there were advantages in the system of preparation he recommended, as compared with sending the meat, if it were possible to do so, to this country, as fresh meat, wholly uncooked?

Dr. Taylor replied he was inclined to rely upon the plan he suggested rather than upon the hope of importing the meat in an uncooked and fresh state. The only means of preserving meat in a raw state was either by the application of chloride of sodium or chemical gases, and in the use of the latter agents there would be great popular prejudices, however innocuous the gases might be. There was an objection to the use of gases which were soluble in water, for this purpose. The other points on which he had prepared information to lay before the Committee, were as to the results of experiments in the drying of meats. The lean of beef contained 69 per cent. of water, and only 31 per cent. of dry solids; the average might be taken as 66 per cent. of water in the meat of beef. In drying these meats they might get rid of the whole of the water except a little which might hang about the tissues. He doubted whether they could get it all back again, but if they did so to an extent so as to make the meat soft, that was all they need look to practically. In the instance of a dried tongue, if instead of getting back the 66 per cent. of water by soaking, they could only get back 40 or 50 per cent., still the meat was eatable in that state. With regard to oysters, it was astonishing how many a person could eat of them, because they contain an enormous proportion of water. The solid residue of an oyster was less than 20 per cent. The analysis of an oyster was as follows:—

Solid organic matter, dry	19·02
Mineral ash, chloride of sodium phosphates	0·87
Water	80·11
	100·00

Thus, in five oysters eaten, four would be water and only one solid. The constituents of bread were—

Water	38·5
Solid residue, starch, dextrine, and gluten	61·5
	100·0

In estimating the nutrient power of food the quantity of water it contained should always be borne in mind.

In reply to the inquiries of the Committee on the subject of extracts of meat,

Dr. Taylor stated he had made examinations of the several extracts proposed on the system of Liebig, Gillon, and Tooth. Liebig's *Extractum carnis* is a stiff paste, of yellowish brown colour, having a strong meaty odour, quite soluble in cold water, like an aqueous extract of animal matter, with a slight acid reaction. The solution is of a dark brown colour. Boiling makes it clearer. It contains no albumen or fibrin, these being insoluble in water at a high temperature. These principles are lost in the manufacture of the extract, and thus only $\frac{1}{10}$th of the solid matter of flesh is obtained while $\frac{9}{10}$ths are lost, so that it could scarcely be called *Extractum carnis*, that term implying "flesh." It contains only that portion of flesh which is soluble in boiling water, and this would be a principle analogous to gelatine, but Liebig disputed the presence of gelatine in his extract. The gelatinization of a decoction on cooling depends upon whether there is a certain per-centage of animal matter present; less than two per cent. would not gelatinize the food, and the gelatinous properties might also be destroyed by the process of heating in the manufacture of the article. The extract made a good soup in combination with other matters, and was well fitted for an addition to other foods. All extracts were open to this objection—that the greater part of the nutrient matter was really left behind; 34 lbs. of flesh, containing nearly 24 lbs. of water, yielded only 1 lb. of extract. For meat of poor quality this process was applicable, but for good meat the retention of the fibrin and albumen was desirable. The extract in question amounted to a good quality of beef tea, and was good as far as it went, but it did not supply the nutritive qualities which were required in animal food. The flesh-producing properties of food in the human body depended upon the solid constituents of meat, of which more than 60 per cent. was proved to be water. There was no process that he was aware of by which more of the nutrient properties could be obtained in the extract than was already obtained under Liebig's system. It could not be regarded as an article of food *per se;* and the price at which it was sold was prohibitory to its extensive use in this country. In respect of the substitution of vegetable albumen for that of animal albumen which was wanting in the extract, it was to be borne in mind that all vegetables contained a very large amount of water—in some cases as much as 80 to 90 per cent. Potatoes contained from 70 to 80 per cent. of water; and in regard to all kinds of food it practically came to this—what amount of solid matter did it contain? The extract of meat made a good food in combination with vegetables, but it would never take the place of solid animal food. On the subject of Gillon's Essence of Beef, Dr. Taylor stated that a sample, which was procured from Bell's, of Oxford-street, in August, 1866, was examined by him in March, 1867. It was, he said, quite liquid, of a pale yellow colour, with a meaty odour. It was not gelatinous; it had a slight acid reaction. It did not become coagulated on boiling, but was copiously precipitated by tannic acid; acetic acid had no effect upon it. It contained a small quantity of alkaline chloride (sodium), but no lime or sulphuric acid. It had a pleasant taste, like beef tea. When evaporated it gave off the odour of meat, without any ammonia. Some flaky matter was deposited; it darkened in colour, and left a brown residue; this residue when burnt had the smell of animal matter, and gave off nitrogen and sulphur; the ash left after burning contained much alkaline phosphate, chiefly phosphate of potash. An ounce of it by measure weighed 488 grains. It was constituted in 100 parts of:—

	In 100 parts.	In 1 lb.
Animal extractive	5·8	406 grs.
Mineral ash, phosphate of potash	1·4	98
Water	92.8	6,496
	100·0	7,000

It contained about $\frac{1}{16}$ of its weight of solid matter of a nutritious kind, or equal to about 1 oz. in 1 lb. of extract, so that a man must have a very capacious stomach to make a really nutritive meal off these extracts. Dr. Taylor added that he had brought with him analyses of infusions of black tea and coffee. The infusion of tea was that made by his servants, and pretty strong. An ounce of it by measure weighed 448 grains. On evaporation it left a brown-coloured extract, which, when heated, gave off nitrogen and some sulphur, with tarry matter. In 100 parts it was thus constituted:—

	In 100 parts.	In 1 lb.
Vegetable extractive, including ash, containing nitrogen and sulphur	0·6	42 grs.
Water	99·4	6,958 „
	100·0	7,000 „

Thus there was of solid matter only 2·88 grains in a cup of infusion of tea.

An analysis of a strong decoction and infusion of coffee showed the constituents to be—one ounce in measure, weighing 480 grains:—

	In 100 parts.	In 1 lb.
Vegetable extractive, tannic acid, &c., &c., containing nitrogen and sulphur	3	210 grs.
Water	97	6,790 „
	100	7,000 „

In addition to the above, Dr. Taylor laid before the committee the following results as to loss of weight in meat cooking:—

	Boiling. Per cent.	Roasting. Per cent.	Baking. Per cent.
Beef	20·5	32	30
Mutton—Legs	20	—	—
„ Shoulders	31	—	—
„ Loins	35	—	—
„ Necks	32	—	—

More was lost by roasting than boiling. In all cases, from $\frac{1}{5}$ to $\frac{1}{3}$ the weight of meat was lost by cooking.

Examination of a Tin Case of Provisions Preserved for Forty-one Years.

The tin case formed part of the stores of the *Blonde* frigate, which went on a voyage to the Sandwich Islands in 1826. On her return, a portion of her stores came into the possession of the late Mr. Thomas Hamlet, jeweller, of No. 1, Princes-street, Leicester-square. In 1831 he gave to me two tin cases of provisions from the stock of the *Blonde*, for the purpose of a chemical examination. They remained in my laboratory at Guy's Hospital until about the year 1846, when one of them was opened before the Chemical class at the hospital. Its contents were found to be in a good state of preservation. They were partly liquid, and partly solid. Before a chemical examination could be made, the contents of the tin case were eaten by some of the Hospital attendants. The smell and taste of the more liquid portion were like those of a rich soup, and I could only make the further observation that they were slightly acid in reaction. The hospital attendants ate the contents without being aware that they had been kept for so long a period, and, as I was informed by my late assistant, they were pronounced to be good.

The remaining tin case was kept in the laboratory, under all the variable changes of temperature, until April 3rd, 1867, and, after a lapse of *forty-one years*, it was opened in the presence of the Food Committee of the Society of Arts. The tin on the outside of the case had perished, and the rim had become rusty, and in many parts very thin. In one part at the top there was the appearance of a comparatively recent crack in the metal. No fluid had leaked out, but air may have slightly penetrated. On removing the cover, there was no ammoniacal or other offensive odour. The contents were solid, compact, and had sunk for almost an inch below the level of the case. A large portion of the upper surface, opposite the part in which there was the appearance of a crack, was covered with a layer of white and red mould. This was removed, and below it there was a thick stratum of a fatty substance, white, very soft, and without any offensive smell. The contents were turned out, and there were large masses of meat like beef, surrounded by and imbedded in the fat. When a section of it was made, the meat presented a red colour, and had a fresh appearance, but by exposure to the air it became rapidly of a brown colour. The meat had an appearance as if it had been cooked; there was no unpleasant odour, but it had lost all meaty flavour.

Within a few hours after the tin case had been opened, I made a chemical and microscopical examination of the contents. The fatty portion was soft like thin lard. It presented no membranous appearance. It had no offensive odour; it readily melted by the application of heat, and evolved ammonia. The melted fat had a well marked acid reaction. It dissolved in a strong solution of potash when heated, evolving much ammonia, and producing a soapy liquid. The chemical properties of the fat had undergone but little change. It resembled adipocere in containing ammonia, but it differed from it in its appearance, and in being fusible at a much lower temperature. The ammonia which it contained was not sufficient to give it that soapy character which has been assigned to adipocere.

The fibre of the meat was very soft, and, by slight pressure, it was converted into a pasty mass. Under the microscope, the fibrous structure of the meat was very well marked, but the striped appearance of recent muscular fibre was not clearly distinguishable.* It retained in a very distinct form the red colouring principle of the blood (myochrome). When a portion of the red fibre was mixed with the tincture of guaiacum and peroxide of hydrogen, it speedily gave to the guaiacum resin that bright blue colour which has been described by Schönbein as one of the properties of the colouring matter of blood. Comparative experiments were made with some raw as well as boiled meat. Both of these turned the guaiacum of a blue colour (but only by contact with peroxide of hydrogen), while the cooked meat, which had been stewed for some hours, acted more slowly, and did not produce so intense a blue colouration as the fibre of the preserved meat. The oxidizing property manifested on this resin by fresh muscular fibre was thus proved to be possessed by this meat after so long a period. This showed that the myochrome or colouring matter of the blood had not been materially changed in it.

The meat, when boiled in water for some time, was not entirely dissolved, some fibre remaining. The solution, which was opaque, was slightly acid, and had a disagreeable odour. It gave off ammonia, and this was greatly increased when a small quantity of potash was added. The fibre of the meat was then entirely dissolved, forming a reddish-brown solution. When the alkaline solution was treated with oxide of lead, the dissolved fibrine was found to contain a quantity of sulphur.

The aqueous solution contained only a trace of alkaline chloride (common salt). It was copiously precipitated by tannic acid, corrosive sublimate, chloride of platinum, and sub-nitrate of mercury,—in all these respects resembling a solution of gelatine which had lost the power of setting into a jelly by cooling. Acetate of lead, and nitroprusside of sodium produced no change of colour.

The fibre was entirely dissolved by cold glacial acetic acid. This solution was precipitated by potash, and the precipitate redissolved by an excess of the alkali, in these respects resembling the fibrine of flesh, but, owing to its altered molecular state, this meat fibre was much more soluble. When a portion of the meat fibre was submitted to destructive distillation, it evolved a large quantity of ammonia and sulphur—chiefly as sulphide of ammonium. Lead paper was blackened, red litmus paper was rendered blue, and the nitro-prusside of sodium, when exposed to the vapours, acquired a rich crimson red colour.

When the contents of the tin case (meat and fat) had been enclosed in a bottle for an hour, there was an offensive smell like that of decomposing animal matter. Test papers were applied, with the appropriate tests, to detect ammonia, sulphuretted hydrogen, and phosphuretted hydrogen, but there was no indication in half an hour of any of these offensive gases escaping from the substance.

The general conclusion from this examination is, that the contents of the tin case consisted of meat and fat

* My colleague, Dr. Moxon, Professor of Pathological Anatomy in Guy's Hospital, subsequently made a more minute microscopical examination of another portion of the fibre, and he states that he found the structure most perfect. The striped markings observed in the recent fibres of the voluntary muscles were very distinctly seen. This affords another proof of the perfect preservation of the flesh after so long a period, namely, that even its microscopical characters had undergone no change.

which had probably been partially cooked but not salted, or only to a slight extent; that the fat and meat retained their chemical properties, but had undergone physical changes in a softening of their substance. These had not been sufficient, however, to affect materially the colour or the distinctly fibrous character of the meat. Small quantities of ammonia were present in the fat and fibre, but these were only indicated by the application of heat. Both had an acid reaction on test paper; this was stronger in the fat than in the lean portions. An upper layer of fat had tended to preserve the meat, and the preservation was aided by the close and compact manner in which the contents had fallen together. The growth of white and red fungi—the former apparently the *penicillum candidum*—shows that at some period, as a result of the rusting of the metallic case, air had obtained access to the contents. The white fungus was accompanied by a crop of a bright, brick-red looking fungus.

It could not be expected that the contents of a tin case, whatever process of preservation may have been used, would be fit for food after the lapse of forty years. The result, however, has a scientific interest in reference to the processes employed for the preservation of food. Out of the three conditions required for the decomposition of animal matter—namely (1), access of free oxygen (air), (2) the presence of moisture, and (3) temperature—the only one not brought into operation here was the first. There is every reason to believe that, when originally prepared, the oxygen of air had been completely excluded from the interior of this tin. There was abundant moisture in the material when opened, and, with regard to temperature, the case had been kept under all variations of summer and winter temperature over a period of forty years. No chemical substance, so far as one could judge, had been used for the preservation of the contents. The quantity of common salt was very small. The food had no doubt been partially cooked and then rapidly sealed up in a vessel made air tight. These results would point to the sufficiency of partial cooking, and the perfect exclusion of oxygen in a free state, for the preservation of the flesh of animals now wasted in South America and in some of our colonies. That mode of preservation, carefully carried out, which allowed the fibre of meat to retain most of its chemical properties for a period of forty years, will, of course, operate with efficiency for two, three, or five years, and, practically speaking, so long a period as this would scarcely be required. The destruction of the tinned iron case by oxidation on this occasion also leads to another suggestion, namely, that these cases should be coated with a thick layer of paint, or asphalt varnish; the latter would be preferable. These might be renewed when the provisions are required to be kept for a long period.—Alfred S. Taylor.

April 5, 1867.

The Committee have received, through the courtesy of Lord Stanley, Her Majesty's Secretary of State for Foreign Affairs, a report drawn up by the legal adviser to her Majesty's Embassy at Paris, and addressed to Lord Cowley, relative to the provisions, action, and effect of the French laws against frauds by adulteration, or by the use of false weights and measures in the sale of food in France, together with the text of the laws themselves. These documents, of which the following are translations, were forwarded to the Committee, in reply to the letter addressed to Lord Stanley, which appeared in a recent number of the *Journal* (see page 305):—

Paris, March 7, 1867.

My Lord,—Your Excellency has asked me what are the provisions of the French law against frauds in the sale of provisions, whether by adulteration or by false weights or false measures. You have, moreover, desired to have explanatory details upon the action and effect of these penal regulations.

I have the honour to send you annexed:—1st. The text of Article 423 of the Code Pénal; 2nd. The text of the law of the 27th March, 1851, the special object of which is the strict check upon deceit in quality and quantity in the sale of goods. The comprehensive terms of these enactments include the punishment of all kinds of frauds. The law does not undertake to define fraud; it leaves that to the discretion of the judge, founded on the facts which come before him. Frauds are as ancient as dealings between men. The Roman law contains many very severe laws upon frauds committed in the sale of goods. The laws of the middle ages against fraud in commerce are very numerous. In our modern legislation since 1789 we find a number of repressive laws, some general, some special, such as those affecting gold stuffs, velvets, cloths, soaps, trade marks, butchers, bakers, &c.

All these laws are in force, and are often applied. In the place of these laws, Article 423 of the Code Pénal can be resorted to, which punishes, in a general manner, all deceit in quality and quantity of goods sold. The decision of the courts has stamped the character of fraud on all acts which affect the genuineness and purity of food. Thus are punished as fraudulent—mixing corn brandy and beetroot brandy with pure Cognac, and selling it under that name; the addition of water to wine and to milk; the sale, under the name of cashmeres, of materials fabricated without the use of the cashmere goat; the sale of artificial mineral waters in place of natural mineral waters; or of all other pharmaceutical productions not genuine. This list might be extended without end, but it is only necessary to repeat that the courts are absolute judges as to what amounts to fraud. They take into consideration fraudulent intention, the illegality of the profit, the tricks of the sellers, and the prejudices of the buyers. It must, however, be added, that the courts have never punished certain mixtures authorised by commercial use, such as the mixture of strong with weak wines to improve the latter; the law only attacks adulterations. The mixture of sugar from the potatoe with sugar from beet root, or from the cane, is a punishable adulteration. Leeches which have been used, and which are sold as fresh, are considered in the light of adulterated goods, and so is also the sale of damaged corn, &c. Article 3 of the law of 27th March, 1851, punishes even the possession of false weights or false measures, or the adulteration of food; and if the food contains noxious substances, the penalty is greater. This provision of the law, however, is not new. It may be found in the books of the Hebrews, in the laws, and in numerous edicts of the middle ages, when all trade guilds had regulations with regard to weights and measures and the quality of the goods. The law of 27th March, 1851, includes all tricks by which the buyer does not get his full weight; thus the weighing of provisions with a very thick paper, though intended as a wrapper, is a fraud in quantity. In a word, it is necessary that the quantity should be exact, though a slight deviation is allowed, of which the court are the sole judges as to what is right, in the same way as they judge of actual frauds and attempts at frauds—for attempts at frauds are equally punishable with frauds themselves.

I will now pass on to the manner in which these penalties are determined and prosecuted, and finish with a few words on the effect of these laws. The surveillance of frauds is confided to the prefects, the sous-prefects, to the mayors, and to the deputies of these officers. It is also confided to the commissioners of police, to the verifiers of weights and measures, to the comptrollers of the warranty of gold and silver materials, and to the officers of revenue. All these functionaries put the law in force, under the authority of general rules, or local rules emanating from municipal autho-

rities; they make, unexpectedly, visits of inspection and verification; they have power to make domiciliary visits. When they meet with an infringement of the law they make out a written report of the case, which is forwarded to the Procureur Impérial, a magistrate charged with the prosecutions of all infractions of the law. The Procureur Impérial summons the delinquents before the police-court, which pronounces the penalty. This is a public proceeding and the duty of a public officer, but there is besides the private action, which every one can bring for damages he has suffered; it is thus that cheated buyers can summon the sellers before the police-court and claim damages for the injuries sustained, unless the Procureur Impérial has obtained them in addition to the punishment. It must not be forgotten that all the legal agents for the prosecution of offences have taken an oath to fulfil faithfully their duties, which renders their testimony worthy of credit; but there is besides the immediate seizing of all things which have aided the fraud. This seizing, which allows the Court to judge by its own tribunals the reality of the crime, is a powerful means of controlling the execution of the law by the agents. If the tribunals have not sufficient knowledge themselves to judge the offence, for example, mixing, in an article of food, strange or noxious substances disputed by the delinquent, they can order a report and require the aid of experts before giving their decision. The trial always takes place before the tribunal of the district where the offence has been committed. The delinquents can defend the prosecution by all the means in their power, such as their good faith, their ignorance, their inexperience in commercial matters, which may be considered as extenuating circumstances, as in all other criminal matters; they can also plead limitation, which is for three years, the same as for other crimes. The two penalties under this law are fine and imprisonment, the scale of which varies according to the gravity of the offence; the terms of the law in this respect are very explicit. Fine is pronounced independently of the damages and restitution which the courts have power to order. The fine is paid to the Treasury; the damages and restitution are given to the injured parties. Amongst the most efficacious penalties is that which orders the judgment to be affixed upon the walls of the street and on the delinquent's door, or the publication of the judgment in the newspapers. Judgment given in matters of fraud in goods may be appealed from by means of opposition appeal and the petition to the *Cour de Cassation* on the ground of being contrary to law. The law of 27th March, 1851, has had for its principal end the prevention of frauds in innumerable cases which occur with regard to provisions; the laws previously in force had been found insufficient in many cases; the foreign commerce of France suffered much from these frauds, which had been constantly denounced in the French Parliament; in 1849, in the single department of the Seine, comprehending Paris and the towns of St. Denis and Sceaux, there were 6,702 complaints of frauds, which were brought before the lower tribunals of police, for want of precision in the old law (article 423 of the Code Pénal), and in the absence of the law of 1851, which was made especially to protect the interests of the working classes, who are the first victims of fraud. This law was much discussed in the legislative assembly. Certain speakers feared lest a facility for such prosecutions should fetter freedom of trade, whilst it was admitted that unchecked fraud is a great embarrassment in matters of business. We do not willingly deal with those countries where fraud is common. A special law of 23rd May, 1857, has extended the provisions of the law of 1851 to drinks, and this was much required. The effect of this active repression has been, as shown by criminal statistics, that the large number of prosecutions and condemnations have led to the diminution of frauds. The following figures are given:—From 1840 to 1850 the number accused of cheating in quantity or quality of merchandise never rose to more than 350 per annum, prosecuted under the old article 423, of the Code Penal; in 1851 the number rose to 4,383 accused, of whom 1,028 were condemned to prison, and 2,862 were fined under the provision of the law of March 27th, 1851; in 1853 there were 7,353 accused, 1,811 of whom were condemned to prison, and 4,724 were fined; in 1858 there were 7,014 accused, 1,639 were imprisoned, and 4,742 were fined; in 1864 only 3,406 were accused, 794 were sent to prison, and 2,470 were fined—a great diminution in the number of accused. It results from these figures that the prosecutions have been very frequent, but also that from 1850 to 1864 there has been an important improvement. The agents of the law never relax in their prosecutions; there is not a week in Paris without numerous condemnations, above all in the retail trade; but, in spite of the vigilance of the authorities, frauds are still numerous, especially as regards quantity, whilst adulterations have considerably diminished. The mixture of noxious matters is especially tending to disappear. The greatest number of condemnations are found to be in additions of water to wine and milk. I hope your Excellency will not consider these explanations too long, and that they will facilitate the understanding of the dry text of the law.

I have the honour to be, &c.,

(Signed) Treite.

To His Excellency Earl Cowley, &c., &c., Her Britannic Majesty's Ambassador at Paris.

Text of the French Laws against Adulteration and the Sale of Alimentary Products by False Weights and False Measures.

Article 423 of the Code Pénal.

Whoever shall have deceived the buyer in matters of gold or silver, in the quality of a false stone, sold for a real one, in the quality of all goods; whoever, by use of false weights and measures, shall deceive as to the quantity of articles sold, shall be punished by three months' imprisonment at least, a year at most, a fine, which must not exceed one-fourth of the value and damage, nor be less than 50 francs. The fraudulent articles or their value, if they still remain in the possession of the seller, will be confiscated, and, moreover, destroyed.

The court can order the judgment to be posted in such places as it may name, and order its insertion in full, or an extract from it, in all the newspapers, and at the expense of the condemned.*

Special Law of 27th March, 1851.

Article I.—The following offenders come within the terms of the above article:—

1st. Those who adulterate alimentary or medicinal substances intended for sale.

2nd. Those who sell, or who offer for sale, alimentary or medicinal substances knowing them to be adulterated.

3rd. Those who deceive, or attempt to deceive, as to quantity the persons to whom they sell or of whom they buy, by the use of false weights, or by false measures, or by false instruments, used for weighing or measuring, or by tricks or plans tending to falsify the operation of weighing or measuring, or augmenting fraudulently the weight or size of the merchandise, even before the weighing or measuring, or by fraudulent indications leading to a belief in a previous exact weight or measure.

Article II.—If in the cases provided for by Article 423 of the Code Pénal, or by Article I. of the present law, a question arise that the offence shall relate to the mixture of articles noxious to health, the fine shall be from 50 francs to 500 francs, unless the fourth of the restitutions and damages exceeds the latter sum. Im-

* This latter clause has been added only since 1863, by the law of 13th May. N.B.—The penalties pronounced by this article can be mitigated by the Court, when they find extenuating circumstances in favour of the accused; the tribunal can, in this case, reduce imprisonment to six days, or only impose a fine.

prisonment shall be from three months to two years. The present article shall even be applicable to those cases where the injurious adulteration shall be known to the buyer or consumer.

Article III.—Those who, without lawful reason, shall have in their warehouses, shops, workshops or houses of business, or in the markets or fairs, either false weights or measures or other incorrect apparatus, for weighing or measuring either alimentary or medicinal substances, knowing them to be adulterated, shall be punished by a fine of 16 francs to 25 francs, and be liable to an imprisonment of from six to ten days, or one of these penalties only, according to circumstances. If the substance adulterated be injurious to health, the fine may be increased to 50 francs and the imprisonment to fifteen days.

Article IV.—When the accused, convicted of breaking the present law, or Article 423 of the Code Pénal, shall have been, in the five years which precede the offence, condemned for breaking it before, the penalty shall be increased to double the maximum. The fine pronounced by Article 423 and by Article I. and II. of the present law, may even be raised to 1,000 francs if the half of restitution and damage does not exceed that sum. The whole of this law is to be read without prejudice to the application of Article 57 and 58 of the Code Pénal.

Article V.—The objects the sale of which, or the use or possession of which, constitute an offence, shall be confiscated, in conformity to Article 423 and to Articles 477 and 481 of the Code Pénal. If they are applicable for food or medicinal use, the Court can hand them over for the use of charitable institutions. If they are improper for use or hurtful, they will be destroyed at the expense of the condemned. The Court can order that the destruction shall take place in front of the establishment or house of the condemned.*

Article VI.—The Court can order the judgment to be affixed in places it designates, and the full insertion or mere extracts in all the journals it names, all at the expense of the condemned. (This penalty is much dreaded.)

Article VII.—Article 463 of the Code Pénal will be applicable to offenders provided for by the present law.

Article VIII.—Two-thirds of the produce of the fines are handed over to the Communes where the offences take place.†

Cantor Lectures.

"On Music and Musical Instruments." By John Hullah, Esq.

Lecture VII.—Monday, April 29.

Musical Instruments. — (*Continued.*)

After briefly reminding his audience of some points in his last two lectures, delivered before Easter, Mr. Hullah said that the bow, to which he should now have to direct their attention, ought to prove an interesting as well as an important subject, for no mere mechanical appliance had ever made so many and such important changes in an art as the bow had made in music. Strangely disproportionate sometimes, however, is what is said about a thing to the thing itself. The poets of modern Europe seem never to weary in singing the praises of the lyre, the lute, the psaltery, and the harp—instruments, three of which no one living has heard, while the remaining one was only exceptionally brought in to the orchestra. Yet which of them has adorned the violin with an epithet worthy of its power, sweetness, infinitely variable intonation, flexibility, and, more than all, power of expression? The violin, to one who has thoroughly mastered it, has ceased to be an instrument, however sensitive and responsive to his touch; it has become rather a part of his own organism—another member—an additional arm. Like a living thing, too, the violin has its humours, its waywardnesses, its good and bad moments. It resents ill-usage. Handled for some hours by an incompetent player, stopped out of tune and bowed badly, it will take time to recover its capability for correct intonation. The imaginative inhabitants of the south of Europe attribute to it a soul. Our sound-post is called in Italy *l'anima*, and in France *l'ame*. The characteristics of the violin family are the finger-board and the bow. As Mr. Hullah had said before, the former was a very ancient invention, certainly known to the Egyptians. Its existence is in no way dependent on that of the bow; and the bow existed long without association with the finger-board. This association, however, when brought about, enormously increased the value of both contrivances. The history of the bow—the time and place of its first application to a string—has afforded matter for much controversy. In investigating the origin of anything—invention, custom, or word—our thoughts involuntarily turn at first to the East; but in the instance of the bow we get little satisfaction, hardly even material for speculation, from that quarter. Instruments of the violin kind have been found in the East, but chiefly in those parts which have been directly subject to European influence; so that it seems quite as likely that the Hindoo or the Polynesian have taken these instruments from us as we from them. No one is bound to prove that the bow was not an Eastern invention. The onus rests with those who think it was, and their only means of raising it seems to be conjecture. The authentic history of the violin is altogether European. The earliest representation known of an approximate one (a copy of which was exhibited) is in the *De Cantu et Musica Sacra* of Gerbert. Gerbert assigned it to the end of the eighth century. The instrument represented has but one string, but in other essentials it is a violin, with a tail-piece, a bridge, two sound-holes, and something like a finger-board. The bow rests on the string, and the portion of the (right) hand shows that it was held like the violin of to-day. There is proof, however, that, anterior to the eighteenth century, a bowed instrument, having three or more strings, was well-known in the north, and not unknown in the south, of Europe. It was called in England a crowd, and in Wales (beyond which it cannot be traced) a crwth. Two drawings of this instrument, of different dates, were then exhibited. They varied in the number of strings, and in some other respects, but were indisputably representations of the same kind of instrument. The bridge of one was nearly, and of the other quite, flat, which of course prevented the bow touching one string without touching two or perhaps all of the others, indicating that the earliest bowed instruments were used for the production not of melody, but of harmony, however rude that might have been. If this was so, it established the fact that the use of the bow and the treatment of combined sounds grew up together, and that the cradle of both was the north of Europe. The earliest mention of the crwth yet found is in an elegy addressed to Loup, Duc de Champagne, about the year 570, by Venatius Fortunatus, who, in the same passage had first used the word harp. The passage might be rendered thus:—"Let the Roman applaud thee with the lyre, the barbarian with the harp, the Greek with an heroic strain, let the British crwth sing." There the instrument is spoken of (by an Italian) as British, and (as Mr. Chappell has acutely remarked) distinguished from the three others as capable of producing sustained sounds, like the voice. From the Celtic crwth come the mediæval words *rota* and *rote*, which are not derived from the Latin *roto*, to turn,—a

* N.B.—This is found to be very efficacious.

† The object of this is to give the communes an interest in putting the law in force. Other articles have been repealed which relate to small penalties.

common error, fortified by the application of the word *rote* to more than one instrument, among them the hurdy-gurdy. This last, however humble its status now, was evidently once held in high estimation. It was called, in the early middle ages, the organistrum, and was no doubt used for organizing, *i.e.*, accompanying melody in octaves, fifths, and fourths,—an effect once thought pleasing. The organistrum is common in mediæval sculpture. A cast from a singularly fine example has just been placed in the Kensington Museum. It is held by two of the elders of the Apocalypse, who occupy the place of honour over the doorway of the Church of St. Iago da Compostella, in Spain. In calling attention to the drawings of bowed instruments (about twenty in number) on the walls, Mr. Hullah said a glance at them would show that in the course of development into the violin of to-day, the crwth had undergone metamorphoses many and great. Having regard to the limited time before him, he thought he could not trace those better than by passing those drawings in review. Before doing so, however, he would say a few words about the various names, or modification of the same name, which these instruments had borne. Most of them were connected with, if not directly derived from the Anglo-Saxon word *fithele*. This word was not disused in England till the beginning of the 13th century, when the Norman aversion to the *th* effectually changed it to *fiele*, and eventually *viele*, which by easy transitions became *viol* and *viola*. The modern names *violino*, *violone*, and *violoncello*, are simply Italian diminutives or augmentatives, or both combined, of *viola*. These derivations or connections, however, have not been unquestioned. The Provençal form is *viula*, and the mediæval Latin, *vitula*, easily affiliated to *vitulari*, to leap like a calf—an expression which might figuratively, *very* figuratively, be applied to the motion of a bow. Mr. Hullah then called attention to (1) a vièle, from a corbel in the church of St. George de Boscherville, in Normandy, of the 12th century. It resembled the modern violin in having four strings, and being held under the chin; the form, however, was different, and the bridge flat. It was, therefore, an instrument of harmony, a fact confirmed by the player being represented singing. (2). A vièle, from a painted window in St. Denis, near Paris, of six strings. (3). A vièle in the hands of a monkey, over whose head was written *Neptunus;* from a MS. of the 13th century, at Douay. This was a great improvement on its predecessors, having expanded into a well-formed oval, with a disengaged neck—an important point. (4). Another vièle, of like form, from the façade of Amiens Cathedral. It had three strings only, and was resting on the knee of the performer. (5). A *crwth* (called in France a *rote*), also from Amiens, having six strings, and presenting a very early example of sound-holes like the letter S. (6). Another vièle, also from Amiens, so placed that its back could be well seen. It was flat, like the so-called Latin guitar. (7). An example of an instrument, the sides of which were *echancrées*, or curved inwards, from a window at Tiges. Mr. Chappell, whose opinions on such points were always worthy of attention, considers that the bent sides were invented "for the purpose of holding the instrument between the knees." Mr. Hullah, demurred to this opinion *in toto*. Examples in ancient sculpture could, no doubt, be found of *echancré* instruments so held, and so could as many or more, in which they rested on the knee of the performer. The "bent sides" originated, he thought, in a very different cause. Though long used as an instrument of harmony, the capabilities of the musical string for melody and expression must have been early ascertained. The strings of the pear-shaped and oval viols he had exhibited were not individually accessible. The bow could not touch one without touching the others. But, by narrowing the sides of the instrument, the outer strings at least could be brought singly within reach of the bow; and so, by elevating the bridge, could the other strings. This great improvement was not universally adopted for a long time. (8) A vièle, from a MS. at Brussels, of the 14th century, in its general aspect had more of the violin character than any of those previously described,—four strings, a bridge, a well-defined neck, and a bow of good length and pattern. (9, 10, and 11) Examples of the *geige* and *gigue* of Germany and France: differing little from the vièle in shape, but considerably smaller. The gigue was in great favour with the *trouvères*, who seldom mention the harp, vièle, and rote (their favourite instruments) without it. Though given up in France and the south, it maintained its favour in Germany till the 16th century, when the German name, *geige* was transferred to the violin proper. (12) A *rebec* (from a picture at Douay), called in the 13th 14th and 15th centuries the *rubebe* or *rubelle*. It had generally two, never more than three strings, tuned, like the violin, a fifth apart. (13) A vièle of five strings, slightly *echancré*, and a fretted finger-board. The gentle curve of the bridge pointed to this as an instrument of harmony—the chords being necessarily executed in *arpeggios*. (14) An example of a vièle closely approaching the violin, with bold *echancrures*, and four strings, tuned by pegs. The steps from an instrument like this last to the violin, though, of necessity, many, could not have been difficult. Nor were there wanting artists to make them. Of some of these Mr. Hullah said he hoped to speak in his concluding lecture. What remained of the time before him he would rather devote to another musical apparatus, hardly less important than that they had been considering—the key-board. The key-board is obviously one of those contrivances the conception and perfection of which, in all that is essential, must have been simultaneous. It has a basis in nature; its proportions depending entirely on those of the hand,—the average length and strength of the fingers. The key-board for fingers, however, was preceded by one for the whole hand, the keys of which were a yard long and three inches wide. Key-boards, of like importance, are still in use for the *carillons*, so numerous in Belgium. They were applied generally to organs from the 11th to the 14th century, after which they gave place to the key-board, such as we now have it. The latter had probably been invented somewhat earlier, and applied in the first instance to instruments of the class which attained perfection in the harpischord. Mr. Hullah then sketched rapidly the early history of the organ, adducing several proofs of its being of greater antiquity than is commonly supposed. He exhibited two drawings of organs from a bas-relief on an obelisk, erected at Constantinople in the time of Theodosius the Great, the fourth century. Even in Western Europe they were known in the fifth century, and at a somewhat later epoch many were to be found in our own country; at Winchester, for instance, in the 10th century, and at Canterbury in the 12th. Of the infancy of instruments, of the harpischord class, Mr. Hullah said little was known. That they were widely spread in the 14th century is certain; that they were invented considerably earlier is very probable. Instruments of this class are long anterior to the pianoforte. The key-board acted long on the plectrum before it was brought to bear on the hammer, though the use of the hammer, like that of the plectrum, is of immense antiquity. Many names have been successively applied to these instruments. There was the clavicytherium, the clavichord, the clavicembalo, the virginal, the spinet, and the harpsichord—all, with whatever varieties, essentially the same instrument. The last and most perfect of them, the harpsichord, had now given place to the pianoforte. Probably, Mr. Hullah said, few present had ever seen or heard a harpsichord. He hoped next week, when he should meet his audience for the last time, to introduce to them, not a mere effigy, but a very tuneful specimen of this class of instrument, the "silence strings" of which he would find some means of "waking into voice."

Twentieth Ordinary Meeting.

Wednesday, May 1st, 1867; Thomas Twining, Esq., Vice-President of the Society, in the Chair.

The following candidate was proposed for election as a member of the Society:—

Whichelo, George, 14, Burnley-road, Stockwell, S.

The following candidates were balloted for, and duly elected members of the Society:—

Bailey, John, 163, Oldfield-road, Salford, Manchester.
Blacklock, Wm., J.P., Hopefield, Pendleton, Manchester.
Burton, Oliver, Tyldesley, near Manchester.
Henson, Henry H., Rutland-lodge, Watford, and 13, Parliament-street, S.W.
Sandbach, Wm. Robertson, 10, Prince's-gate, Hyde-pk.

And as Honorary Corresponding Member,

Nobile, Signor Commendatore Gaetano, 14, Via Salata ai Ventaglieri, Naples.

Previously to the reading of the paper, the Secretary drew attention to a form of self-acting buffer-break, invented by Mr. C. E. Parker-Rhodes, and intended for use on railways. The principal peculiarity appears to be that the buffer acts upon the break so as to produce a downward pressure on the wheels. The inventor states that his arrangement produces a gradual stoppage of the train, from the engine to the last carriage.

The Paper read was—

ON A MACHINE FOR TYPE-WRITING.

By John Pratt, Esq., of Alabama, U.S.

Custom has so intimately associated the idea of writing with the implement employed in that very ancient art, that most persons, on reading the announcement of to-night's paper, will naturally be in some doubt as to what may be meant by "a machine for writing with type." On the other hand, printing having been for so many ages the sole purpose to which type has been applied, it is not, at first thought, readily conceived that type may be used for any other process. It is only necessary to recur to the true definition of the words writing and printing to reconcile the apparent contradiction. Printing is not, it must be borne in mind, the formation of letters of a particular shape, but of rapidly multiplying copies by means of a press and a bed of movable type—entire words, paragraphs, or pages being impressed at once. Writing, on the other hand, may be largely defined as the art of producing, no matter by what means, the first or original draft of a composition. Viewed in this manner, there seems to be nothing obscure in the title I have chosen for my invention; yet nearly every one to whom I have had occasion to mention it has seemed at first puzzled by the seeming contradiction of the terms "type," and "writing." But the idea of writing with type, though so incongruous, because so new to most persons, is not a sudden growth though a somewhat recent one. Indeed inventions, though children of the brain, are by no means Minerva-like in their birth. They are not manufactured. When questioned closely as to their origin and laid bare of the exaggerated claims of their authors and the enthusiastic statements of biographers, they will almost always return the unsophisticated but profound answer of Topsy to her New England catechist, "I spees I growed." Let me not be misunderstood. I am speaking of inventions, not of the thousand patent mouse traps, nutmeg graters, clothes washers and wringers which cumber patent offices in every part of the world, and perhaps tend more than anything else to worry statesmen and journalists, who should know better, into a peevish hostility to patent laws. No matter to what class belong the various essays to invent a subsitute for the pen, their origin is not so remote as to be doubtful or obscure, and I shall be excused by their very recentness and consequent novelty for briefly noticing them before entering upon a description of my own effort. Before doing so, I must premise that you must not expect me to describe a machine intended for, or proposed to be adopted into general use, as a substitute for the pen. There is none such. As well might you expect to find a lineal ancestor of the sewing machine. This species of development no more proceeds in a right line than the Darwinian, and allow me to say that in tracing its history you will often be encountered by a "missing link." Certainly the first modern printing-press is almost as far removed from the Chinese printing blocks, and Hargreave's jenny from the old-fashioned spinning wheel, as a free and equal "contraband" from his reputed ancestor in the Zoological Gardens. It would be presumptuous in me to claim as great a gap between my poor idea and analogous inventions already made. I do but say that I am the first to invent a writing machine *par excellence*.

The first machine of this kind that I have seen mentioned, is a machine for the blind, invented by M. Foucault, and which was awarded a gold medal in the Paris Exhibition of 1855. The type in this machine was formed on the ends of a number of converging rods, sliding in grooves cut on the surface of a metal plate. These rods were simply pushed to the point of convergence by the finger, where they produced a legible character by means of carbonized paper, the latter being moved as the writing progressed, by a pawl and rack. The Hughes' machine for the blind, which many present have doubtless seen in the Kensington Museum, though not so rapid as Foucault's, is a considerable step in advance on the main idea, inasmuch as the types have a movement in common, and, therefore, cannot clash and clog as with separate converging types, competing, as it were, to reach the same exact point. In the Hughes machine the types pass through the periphery of a circular plate, in a direction parallel to its axis. The plate revolves horizontally on its centre, and the types are successively wheeled to the point where the impression is made, which is done by pressing a lever upon the butt of each type. The whole mechanism is quite primitive, and works slowly, the plate being revolved by the hand, without the intervention of any kind of mechanism.

The next inventions in this general direction are two machines for "writing and making stereotype moulds," both by Americans, and patented in England, the one in March, the other in May of 1866. One of these, invented by Mr. John E. Sweet, is now in the Paris Exposition, where, I believe, it has attracted considerable attention. Though differing much in detail, these machines agree in their salient feature, to wit, the mode of bringing the type to the point of impression. The types are ranged around the periphery of a wheel moved, like the type wheel of the printing telegraph, by clock-work, or by a crank turned by an assistant. In Mr. Sweet's machine the wheel revolves horizontally, and the types are ranged parallel to the axis; in the other invention, they converge towards the centre, like the spokes of a carriage wheel. In both machines, piano keys are employed, each of which stops a particular type at the point of impression; and both in this respect resemble the printing telegraph. The particular manner in which the keys of one of these machines (Mr. Sweet's) perform this office, is very different from that employed in the printing telegraph, and displays much ingenuity.

Several other inventions have been made or attempted for printing and writing, which I need not more than mention. In 1864, a Frenchman, M. Bryois, filed a provisional specification in the British Patent Office for a

stenographic machine. It was a crude idea, based on the principle of converging levers. In August, 1866, an invention for "writing and printing" was patented in the United States by a Mr. Peeler, somewhat resembling, I believe, the Hughes' machine for the blind, one lever only being employed for the impression and for controlling and moving the type, instead of a number of keys, and, therefore, like the Hughes' instrument and the one-keyed telegraph, necessarily slow. Finally, on the 21st of last March, a paper was read before the Polytechnic Institution in New York, descriptive of a machine, also for "writing and printing," by a Mr. Hall, which employed piano-keys, and a type-wheel, acting, like the other wheel instruments, on the same general principle as the printing telegraph. I have not described particularly the manner in which, in these various inventions, the paper is moved over the point where the impression is made; nor is it necessary to do so, as the operation itself, of feeding material as it is worked up, is common to many other inventions, and they all adopt a device analagous to that of the sewing machine.

It will be seen, from what I have said, that considerable progress has been made towards the invention of a writing machine. In the first place, the idea has germinated in many different minds, in widely separated parts of the world, that type may be substituted for the pen, in producing the original draft of a composition, as well as in multiplying copies. Again, we find the idea developed that only one set of types must be employed, that they must be brought to the same point in arbitrary succession, a corresponding impression formed there, and, at the same time, the paper which receives the impression move automatically as the work requires. And, in every case, we find carbonized paper employed instead of fluid ink. Nor are these ideas merely theoretical. Most of the machines I have mentioned do very good work, and are a great improvement upon the pen in legibility at least. They all have one defect, which must prevent their employment as substitutes for the pen. They are too slow,—those employing converging type, because of the interference of the types with each other; those employing a type wheel, because of the distance to be traversed by the type. The machines employing piano keys, and constructed on the principle of the printing telegraph, are also objectionable, on account of their great costliness, their cumbrousness, and the necessity of employing extraneous power, or otherwise clockwork, which requires winding up at very frequent intervals. In the case of the telegraph, and of machines for making stereotype moulds, a high speed, though desirable, is not necessary, and the expensiveness of the machine is comparatively unimportant. With a machine designed as a household or ordinary office implement the case is otherwise. Again, machines like those invented for the use of the blind, though sufficiently economical of construction, are even less rapid and less adapted for general use.

I must now approach my own invention, which I do, I assure you, with great diffidence; I know that I have undertaken to do that which many will say is impossible—and say it, perhaps, after I have exhibited the operation of my instrument—to wit, the useful substitution of machinery for manipulation, in an art requiring only less arbitrary and varied movement than that of which its hieroglyphic origin proves it to be the offspring —I mean the art of drawing. Besides this, I am conscious of having as yet fallen far short of the goal at which I aimed at starting, namely, the invention of a machine possessing sufficient rapidity for *verbatim* reporting. Observe, I say I have fallen far short, not failed, for I am confident that a machine may be, and will be, constructed on my principle, sufficiently rapid to record, with the aid of a phonetic alphabet, devoid of word signs, every sound as fast as it is uttered in ordinary conversation. I have not, however, practically developed the idea to that extent; indeed, I have fallen far short of it. The instruments on the table are capable of a rapidity only about twice that of the pen when used in long hand.

Though not so rapid as might be desired, the art of writing with the machine is so simple, that a child will write with it, at its first essay, almost as well as ever after. To acquire rapidity is a work of greater time and labour, although insignificant when compared with that requisite for the mastery of a swift hand with the pen. I have myself been too much occupied with perfecting the invention, and have changed too often the arrangement of the keys, to pronounce definitely how long a time must be occupied in bringing out the full capacity of the machine. I can only say that, after about two weeks' practice, at the rate of two or three hours a day, I can write, with the arrangement of keys I now employ, about as fast as with the pen—say twelve folios an hour. I will explain hereafter my device to still further increase the rapidity of the instrument. For the present, I must be satisfied to claim a rapidity, capable, I think, of demonstration, twice that of the pen, with the legibility of print. Now for my apparatus.

Keeping in view the manner in which the types are arranged and moved to the same point in the inventions I have outlined, and the cause of their low speed, namely, the interference of the types when converging, and the great distance through which they must move when brought to the point of impression by the revolution of a wheel, the problem to be solved by a successful invention of the kind assumes a definite shape. It is so to dispose the types that they may have the smallest possible distance to traverse, in order to arrive at the point of impression. For this purpose it is obvious that it is most advantageous to arrange them in a number of series in the form of a square, instead of in a single line, as in the wheel machines. Thus disposed, the distance to be traversed by the most distant type, is only the square root of what is necessary in the other case. Thus, taking the dimensions of a single type as the unit of measure, if 36 characters extend $\frac{36}{1}$ of an inch when ranged in one series, they will extend only one-sixth of that distance, or three-eighths of an inch, when placed in the form of a square. But in order that the type may be successively brought to the same point, the plate must have a great variety of movement, both as to direction and distance, and this variety must be differentiated, so to speak, out of one simple vertical movement of a number of levers. The solution of this geometrical problem is the main feature of my invention, though I may as well observe, here, that my methods of moving the paper, and making the impression are also new.

The whole mechanism is contained in a small case, composed of two rectangular frames, mounted the one on the other, giving the side elevation an L shape. A number of levers, furnished at one end with keys, extend from front to back the interior length of the case. Extending across, and a short distance above these key levers, near the back of the case, are two oscillating plates or rocking frames. Between the fulcra of the key levers and the oscillating plates just mentioned is a third oscillating plate, also placed above and across the key levers. These three oscillating plates are moved simultaneously by each key, and perform simultaneously the three different operations already mentioned as requisite in a machine for writing with type, namely, bringing the types in arbitrary succession to one point, forming a corresponding impression there, and moving the paper.

First, the manner in which the types are brought to the same point. These are disposed in slight converging lines on the face of a thin metal plate, which, for economy, is electrotyped in the ordinary manner. This plate is worked by the simultaneous and combined action of the two oscillating plates at the back of the case. If you will bear in mind the connexion between a line and a single force on the one hand, and area and compound force on the other, you will more readily conceive the *rationale* of this part of the

mechanism. With one of these oscillating plates, the type plate is connected by a vertical lever, to the upper end of which it is fixed, being supported at its back by a metal bar. With the other oscillating plate, it is connected by a bell crank lever and two wire links, one of which extends vertically from the horizontal arm of the bell crank to the oscillating plate; the other passes horizontally from the vertical arm of the bell crank to the lever to which the type plate is attached. If only one of the oscillating plates be moved, the type plate moves in only a vertical or horizontal direction, according to the one employed. When both are moved together, the resultant motion of the plate is diagonal. By varying the relative degree of the two movements, the direction of the type plate is equally varied, and any given type may be moved to any desired point. In other words, by varying the relative amount of movement of the oscillating plates, the vertical or horizontal movement of the type plate may be made to preponderate, more or less, in an indefinite degree. This variation is effected by adjusting screws, which pass vertically through the key levers, and impinge against the under surface of the oscillating plates. Through these screws, the key levers, though having the same relative movement, communicate each a different degree of movement to the plates, and this difference in extent becomes a difference in direction when the motion is transmitted to the type plate. A machine, when finished, is adjusted in a manner very analogous to the tuning of a pianoforte, with the important difference that performers may tune their own instruments in a few minutes, and may also consult their own taste in the arrangement of keys. The motion of the type plate is checked at the proper moment, to receive the stroke of the type hammer, by springs, which oppose a moderate and nearly uniform resistance to the movement of the oscillating plates.

The Society will perceive that I have presented two models for their consideration. These instruments, although employing a different number of keys for the same number of types, are identical in principle. In one, the oscillating plates extend across the whole number of key levers, so that every lever may operate both plates, and thereby exert a complete control over its respective type; in the other, they extend only half the lateral space of the levers, each lever operating only one of the plates, and therefore producing only one movement of the type-plate, so that it becomes necessary to depress two keys at once in order to bring any given type to the impression point. The variety of movement requisite to control the whole number of characters is procured by employing the keys permutatingly, each key being employed in conjunction with a number of other keys. This arrangement, although open to the objection of requiring the simultaneous employment of two keys—an objection which, at first, caused me to reject the idea altogether—has the advantage of requiring a much smaller number of keys, for, since each key controls a row of types instead of a single type, the number of keys need only equal the number of horizontal and vertical rows; in other words, twice the square root of the number of types. For instance, if there be 64 types arranged in eight horizontal and eight vertical rows, the number of keys need be only 16.

For convenience, I have arranged the keys which give the plate a vertical movement on the right-hand side, and those which move it horizontally on the left-hand side of the machine, leaving some space between them. This, however, has nothing to do with the principle of the invention, as the other instrument also may, without removing or adding a lever, be so adjusted as to require the simultaneous depression of two keys, in which case all the keys beyond twice the square root of the number of characters become supernumerary. There was, however, a considerable practical difficulty to be overcome in adapting this arrangement. This was the deflection of the plate from a right line in its vertical movement, caused by the arc described by the horizontal link connecting the bell crank lever with the type plate lever. Thus, if I keep depressed the key which brings the first left-hand series of types under the hammer point, and meanwhile depress a key which moves the plate downward, the arc described by the link will cause the character at the upper end of the series to be deflected to the left about one hundredth part of an inch, an error of great consequence in so nice an operation as writing at all accurately with type. This might have been remedied by having the characters engraved on the plate in lines, having a counter curve of a radius equal to the link, had it not been for the necessity that they should converge towards the hinge of the type-plate lever. I finally overcame the difficulty by hinging the bell-crank lever to a second lever, to which I give a movement to the right, by means of a link attached to a lever operated by one of the oscillating plates. The arc described by the last-named lever neutralises the arc of the bell-crank link. Engineers will doubtless perceive the analogy of this device to the parallel motion of Watt. In this parallel motion the problem is complicated by the circumstance that the link whose arc is to be compensated is hinged to a shifting centre, namely, the upper arm of the bell-crank lever.

I hope I have said enough to convey a sufficiently accurate idea of the manner in which the first operation of my machine is performed. I have been somewhat full in the description of this part of my invention, because I am not aware of any analogous employment of compound motion, in any branch of mechanics, to produce indefinite variety of direction.

In describing the second operation of my machine—namely, the impression—I shall be very brief. It is effected by a hammer, having a face equal in extent to a single type, which strikes against the several types the instant they are brought within its range, a sheet of carbonized paper held in contact with a sheet of writing paper. Transparent transfer paper may be also employed, as well to enable the operator to see the progress of the writing, as to preserve a copy. The hammer is operated by an oscillating plate, with which it is connected by a small rod hinged to its butt. This rod has at its lower end a catch, which engages an arm projecting from the oscillating plate, and having an eccentric movement, which causes it to act in a manner somewhat analogous to the hopper of a piano. The depression of a key lowers this eccentric arm, and retracts the rod and hammer. Just as the key has been carried through its full movement, and the corresponding type brought to the proper position, the catch is pushed off the eccentric, and the hammer impelled against the type by a spring. The exact moment when the hammer is released from the catch—a matter of great nicety—is determined by a screw adjustment. When the key is released, the arm of the oscillating plate again engages the catch, and the hammer is ready for a new stroke. It is therefore necessary, with this arrangement, to release one key before striking the next; and it is this necessity that limits the rapidity of the instrument, which otherwise might strike off printed characters as fast as the piano can yield consecutive notes.

I have overcome this difficulty by applying the device for operating the hammer to each one of the key levers, instead of to the oscillating plate, and thus there are always a number of levers ready for action. The principle and efficiency of this device, which has not yet been applied to the machine, I have demonstrated by a partial model employing only the mechanism requisite for operating the hammer. This modification, however, is not adopted as a mode of removing a defect, but of adding to rapidity, which will be found already sufficient for the requirements of most operators.

Now for the feed of the paper. A square open frame, which for distinction may be termed the page frame, slides in vertical grooves formed in the upright part of the case, in the plane of the type plate. Within this, a second frame, which may be termed the line frame,

moves horizontally from right to left. The movement of the latter makes the lines, and of the former the pages, of writing. The movement of the line frame is given by a square steel rod revolving in vertical bearings, and moved by a spring, which is wound up at the completion of each line by striking a key. The motion of the rod is communicated to the frame by a small pulley, turning with the rod upon which it slides with the page frame during the progress of the writing. Its movement is regulated by an escapement wheel and pallets, the latter being connected by a link with an arm projecting vertically from the oscillating plate which operates the hammer. The same key-stroke which moves the hammer produces an oscillation of the pallets, and allows the paper to move the distance of a letter and space. The oscillation of the pallets may be effected by a partial movement of the keys, so that the paper can be moved without moving the hammer, when it is required to make a space instead of a letter. By this means I get rid of the space key used by all previous machines of this or an analogous class, every key serving as a space key. The carbonized and writing paper are held in a clamp resting loosely in an angular projection of the line frame, whence they are easily and quickly removed for a fresh sheet of paper.

It only remains to show how the paper is brought back to its starting point for a new line. To reverse the movement the escapement wheel must first be freed from the pallets, which for this purpose are mounted on a lever, connected by a link with one of the key levers, and the depression of which effects the disengagement. This done, a second key must be struck, which operates a link, bell-crank lever, and toothed sector, thus reversing the movement of the frame and bringing it to its starting point.

To make the proper interval between the lines, the page frame is provided with a rack, moved by a pawl of peculiar form and adjustment, which leaves the teeth always free, so that the frame may, at any stage of the writing, be moved in any direction. The pawl is operated by aid of one of the key levers with which it is connected by a vertical link rod. A page being completed, a new sheet of paper is placed in the clamp, and the page-frame is pushed back to the bottom of the grooves.

To judge from the length of time it has taken to give a rather general idea of my invention, one might be led to suspect that it is a very complex affair. But I think it will generally be found in machinery that the most complex idea, if fully matured and thoroughly developed, is the simplest and most economical to embody in the actual machine. At least, I know this to be the history of my own invention. My first effort was based on the simple and comparatively obvious idea of converging rods; and yet, if you could compare a model which is still, I presume, in the lumber-room of a pianoforte manufactory in Glasgow, with those on the table, you would perceive a great improvement as regards simplicity and economy of construction. I may as well mention that these possess another important quality lacking in my first machine, namely, the capacity of writing—a feat the other, though otherwise unexceptionable, wholly refused to perform.

But I think a glance at the construction of these instruments is sufficient to convince those who have a knowledge of machinery of their simplicity and economy. The case is small, compact, and being subject to no strain, must last indefinitely. The key levers, which are of wood, are strung on a polished steel wire, and work on the cloth centres, so serviceable in the piano, and so cheaply renewed when worn. The oscillating plates and hammers are also of wood, working in similar bearings. The other levers are hinged on vellum joints which cost little and last almost a lifetime, and, finally, the links immediately controlling the type plate work in india rubber joints which have no friction, no wear whatever, and can never become loose. The only parts of the machine which must be of metal are the type plate, the hammer head, the escapement wheel and rod, and a few pieces of steel and brass wire. The type, not being subject to any corrosive action, and being protected by the leather which covers the face of the hammer, will last almost indefinitely, and when worn out—of which I, in my brief experience of the matter, have seen no indications—may be replaced for a penny. Again, owing to that peculiar feature of the machine,—the screw adjustment of the type—type plates of different sizes, styles, and having various complements of type, may be employed in the same machine. To recur to the question of simplicity and economy of construction, which in an invention of this kind is of special importance in estimating its utility, I will merely add that, with sufficient capital to manufacture on a large scale, it may be easily sold at a very large profit for three guineas, a sum not much greater than the cost of the paper that would be saved by a year's employment of the machine in an office having much correspondence, and but little more than the copying press now used in all counting houses, and which would be rendered useless by the adoption of this writing machine.

A larger and more interesting question than the question of economy of manufacture is behind. Is there a want, and does the invention supply it? If the pen is everything that is required in the combined qualities of legibility, accuracy, rapidity, and ease of mastery, then this invention is useless. Again, if this writing machine is not more rapid, legible, accurate, or easier to learn than the pen, it has not supplied the want, and some inventor possessed of greater ingenuity, more patience, and fortitude under discouragement, or more abundant means and leisure than I, must and will come to the rescue; for civilized man knows no real want which civilized man cannot supply.

It is almost needless to show the existence of a want of a brain-tool better than the pen. Its inaccuracy quashes indictments, increases and breeds litigation, and hinders and delays the law-suits it engenders. Its obscurity and illegibility obstruct the author in criticising his composition, the publisher in estimating its worth, and the printer whose eyes are worn out in trying to decipher it. In short, it increases the cost of books, and diminishes their literary value. In private and public correspondence this defect of the pen is felt as almost a nuisance. I say felt, because as long as it is not clearly seen that an implement may be improved, or wholly or partially supplanted, its short-comings are very naturally attributed to want of skill in the operator.

The next question is, what a machine of this class must be capable of accomplishing in order to be useful, other things being equal. This is a question that will receive various answers from different individuals, but perhaps there are not many who will pronounce useless a cheap and durable machine, having even the rapidity of the pen, the legibility of print, so easily understood, that a child that cannot write with the pen will write as well with the machine as after a lifetime of practice, and so easy to master that, after a few weeks' leisurely practice, one may write as fast as with the pen. At this point, then, I shall stop. It may, it is true, be demonstrated that the machine possesses a far higher capacity for speed, for by striking the keys at random more than twice as many letters may be formed in regular succession as with the pen, and by adopting the modification of hammer stroke referred to in the description of the machine, there is no limit to rapidity, except what the nerves and muscles of the operator impose. But I repeat, that I shall be content to bring the invention up to the criterion first named, and which my own very brief use of the machine demonstrates can be done.

After reading the paper, Mr. Pratt explained in detail the various parts of his machine, and exemplified its practical working by copying a paragraph from a newspaper that had been handed to him.

DISCUSSION.

Mr. Campin said he was afraid he did not quite understand the details of this invention, which, however, appeared to be a very ingenious one, and likely to have its uses. There were one or two points, independent of the nature of the machinery, which he would be glad to be enlightened upon. In the first place, he would ask whether this machine would produce a number of copies of that which was written or only one?

Mr. Pratt replied it would give three or four copies at once if required.

Mr. Campin further inquired whether there were the means of correcting inaccuracies as was done in ordinary writing, by striking the pen through the word and re-writing it, or by interlineation. One point which struck him was that, if this invention were brought into use, they would not have the advantage which they now had of identifying a person's letter by his handwriting, because all letters would be in the same printed type.

Mr. Galloway asked whether this was proposed as a new system of printing generally?

Mr. Pratt, in reply to Mr. Cowper, stated that corrections and interlineations could be made as readily by the machine as with a pen. If a wrong letter or word was written, it could be erased, and another put in its place. The paper could be run back to the same point, and the interlineation could be readily made; there was no difficulty whatever about that. In answer to the last speaker, he would state that this invention had nothing at all to do with printing. It was simply a writing machine, which would work more rapidly than the pen, and the result would be more legible. As a matter of course, this machine did not furnish the means of authenticating documents. The machine was not intended entirely to supplant the use of the pen, any more than the sewing machine would ever supplant the use of the needle. There were some things which the sewing machine could not do, and it was the same with this machine. It could certainly not be employed in book-keeping and the making up of ledgers. It was a machine the use of which was so readily acquired that it might be superadded to the accomplishment of writing with the pen. It was brought forward as a good substitute for the pen for writing letters or manuscripts for the press, and he thought for law-stationers it would be valuable, because it was so much more legible and so much more easily acquired than writing, and one person could write with it as well as another, when the operation was confined to the mere copying of documents.

Mr. Curley, in reference to the question of the multiplication of copies, said it was often the case that from ten to twenty copies of law papers were required, and it was necessary for the type to be composed for that purpose. He wished to ask whether it would not be practicable, in this machine, to have several frames arranged so that one set of keys could move the whole, and as many copies as were required struck off at one operation?

Mr. Pratt replied that the machine, as at present constructed, could furnish three or four copies of a document, in which case very thin paper must be used. In cases in which twenty or thirty copies were required, he thought they could be produced more economically by transferring an impression to the lithographic stone. A paper written by the machine with the thick oily ink he used, could be transferred direct to the stone, and any number of copies could be printed from it.

Mr. Campin inquired whether ordinary writing paper could be used, or whether it was necessary to use the paper employed for manifold writing?

Mr. Pratt replied that three or four copies could be produced on ordinary note paper, provided it was not of extra thickness. Specially prepared paper was not required. In reference to the specimen of writing which had been handed to the meeting, Mr. Pratt said any mistakes that occurred were his own fault and not that of the machine.

Mr. Galloway thought that the time required for the operation was as great as, or greater by this process than by the ordinary method of writing. With respect to its application to letter writing, they knew that in mercantile transactions the handwriting formed an essential element, therefore he felt the invention would have much to contend with on that ground.

The Chairman said it now devolved upon him to ask those present to pass a vote of thanks to Mr. Pratt for his able paper, describing a most interesting, and, as he hoped it would prove, a most valuable and useful invention. He had no doubt the meeting would cordially join in that vote.

Mr. W. H. Bonnewell said he hoped it would not go forth that in passing that vote of thanks to the author of the paper, the meeting endorsed the feasibility of the invention which had been brought before them this evening. He would be sorry to throw any discouragement upon an ingenious invention; but having had some experience in these matters, he felt himself compelled to give an adverse verdict upon it. He recollected two or three years ago, there was an ingenious plan brought before this Society for boat-building by machinery, and a company was formed for carrying it out, but the whole thing was a signal failure, though it went forth to the world with a kind of impress from this Society as to its merits, in consequence of a vote of thanks having been passed to the reader of the paper. He would therefore say, while he quite concurred in a vote of thanks being given for the great ingenuity displayed in the construction of the machine, at the same time if that vote was to be regarded as a verdict in favour of it, he should feel disposed to dissent.

The Chairman said he hoped it was quite understood that this Society did not pledge itself in any way to the merits of anything which was brought before it. A machine of an ingenious character had been ably described, and with regard to the passing of a vote of thanks to the gentleman who had done so he was sure there could be but one opinion.

The vote of thanks was then unanimously passed.

Mr. Pratt, in acknowledging the compliment paid him, said it would be an ungracious act on his part to attempt to obtain from this meeting any special recognition of the good qualities of the machine he had brought before their notice. His object in reading the paper was merely to describe the machine, but the brief explanation he had thus been able to give would not be sufficient to establish its merit or demerit. Experience alone could do this. He had merely brought it forward to let it be known that there was such a machine in existence, and he left it in the hands of the public for what it was worth. He begged to thank the meeting for their kind acknowledgment of his paper.

Fine Arts.

PARIS ANNUAL EXHIBITION OF WORKS OF LIVING ARTISTS.

The *Salon* opened, according to announcement, on the 15th ult., and now competes, to a certain extent with the Universal Exhibition. The number of paintings collected in the Champs Elysées is 1,581, or more than four hundred less than last year. It is said that the admission jury was excessively severe, and undoubtedly the number of very bad pictures is not large this year; unfortunately, the absence of works of striking merit is equally beyond question. Few of the leading artists exhibit, and those who do have generally sent small works. The great room, or *salle d'honneur*, is relatively poorer than the rest, for the two chief places are occupied by canvases which are more remarkable for size than for artistic value. One of these is the "Tapis

Vert"—the gambling-table of Baden—by Gustave Doré, which exhibits fertility of conception, daring colouring, humour, an eye for character, but sadly wants composition, harmony, and elevation in the treatment; the other is an immense decorative composition, by M. Puvis de Chavannes, called "Le Sommeil."

The most remarkable pictures in this principal room are—"The Abandonnée," by M. Schreyer, a young artist who obtained medals in 1864 and 1865. The subject is not highly attractive; a cart on a bleak moor, the carman and one horse dead, struck down, perhaps, by lightning, and another horse imprisoned in his harness, and apparently nearly dying of hunger; the last-named animal being painted with rare talent. "Feuilles d'Automne," by Hébert—an exquisitely painted forest lane, carpeted with yellow leaves, along which passes a melancholy female figure in black; the same artist has in another room a fine characteristic figure of a gipsy woman. "The Promenade," by Heilbuth; a cardinal is walking on a terrace, and gives his hand to a child to kiss, two footmen looking on with most comic gravity; the picture forms a companion to the meeting of two cardinals exhibited a short time since by the same artist. "Byblis changed into a stream," from Ovid's metamorphoses, is a good made study, by Henner, who has received all the medals. "Pius IX. in adoration before the statue of Saint Peter," with a priest and peasants prostrate on the pavement, by Jules Joseph Lefebvre, a young artist who won the prize of Rome in 1861. "An Episode of Saint Bartholomew," by Isabey, who has exhibited but little of late, a small picture of the interior of a church desecrated by frightful massacre, painted with admirable force and effect. Two charming flower pieces, by a young artist named Maisiat. "The Prince Imperial entertaining his young fellow soldiers in the Bois de Boulogne," a cabinet picture by Yvon, the well-known painter of battle-pieces. "His Highness on a Journey," by the clever artist Knaus, of Dusseldorf; a German officer, whose face is wrinkled with care, is followed through a village by two other officers, one fat and full of mischief, the other a young military dandy of the first water; the schoolmaster, the notabilities of the place, and a crowd of children, bowing, smirking, and staring in the most amusing manner, while a little dog, in no way awed, barks furiously at his excellency. The attitudes and faces are admirable, full of humour and variety, exquisitely comic, but all kept fairly within the legitimate bounds of art. M. Cabanel has only two portraits, one of the Procureur-General, the other of a lady, but they are certainly not equal to other works by the same hand. "The return from the Crimea," by Protais, a party of soldiers on the deck of a ship, many of them wounded, hail their native land with intense and varied expressions of interest; the picture is interesting, but the artist has produced better works. "Visit of Josephine de Beauharnais to her husband, confined in the Luxembourg," a pleasing picture by Viger. A large and well-painted picture of a slave market, by Victor Giraud, a young artist, holding forth good promise; the prosaic air of the richly-dressed purchaser, and the varied attitudes and expressions of the slaves, are expressed with great effect. An admirable view of one of the famous rooms in the museum in the Hôtel Cluny, by an older painter of the same name—Charles Giraud. A fine portrait of the Archbishop of Paris, by Lehmann; "Queen Hortense dispensing charity at the fine old Chateau of Ecouen," a pleasing composition, by Eugène Lejeune; a somewhat formal representation of the arrival of the remains of Napoleon, by a well-known artist, Felix Philippoteaux; "Job and his Consolers," by Lecomte Dunouy, a large composition of some merit; a pretty pastoral scene, three peasant girls returning from the fields, one of them with an arm thrown over the shoulders of her two companions, and a child with a poppy in its hand, by an able artist,—Jules Breton; a somewhat meretricious picture of Napoleon when First Consul at the marriage of Junot, by Jules Masse, a pupil of Delaroche. One of Meissonnier's gems, a party at the door of a roadside house, the chief figure, a cavalier, admirably posed; the work has not so much interest as many others by the same artist, but the treatment and costume are out of his general style, and therefore present a new phase of his ability, and the handling is exquisitely delicate. Lastly, four landscapes, two by Rousseau,* in his usual style, scarcely supporting his deserved reputation; and two by our countryman, MacCallum, which attract great attention; one scene is laid in Windsor Forest, and challenges criticism from the strange, flat, yellow tone which pervades the whole picture; but the other is, unquestionably, a magnificent work; it represents a clump of oaks on a rising knoll in the forest of Sherwood; and the rendering of the trees, the perspective, and the atmospheric effect, are most remarkable; the picture is very large, and original in treatment, and is certainly one of the gems of the *salon*.

The following are a few notes made during a first visit in the other rooms of the exhibition:—A pretty "Psyché," by an artist of standing, Amauray Duval; a charming young nude figure, entitled, "Idylle," by a rising artist, James Bertrand; a pretty quaint composition, "The House of the Painter at Pompeii," the artist engaged on a mural decoration, by Biennourry; a charming picture, called "Ribéra painting at the door of the Ara Cœli at Rome," a little child in bright-coloured apron, standing in the centre, against the old gray wall, and several other figures; and a curious, but powerfully-painted female figure, called "Gaby," by the same artist; a picture, called "Le Mamillare," representing the toilet of an antique dame, treated somewhat after the manner of Gérome, by G. R. Boulanger; "The Sixth day of Creation," a most curious attempt to represent an unapproachable subject, by Brion; an exquisite study of a "Young Girl of Rhodes;" and a pretty little composition, "A Jewish School at Tangier," by Madame Henriette Browne. "La Lectrice," by Compte-Calix; a beautiful girl in mourning (a governess, probably), is reading to a family; two young men watch her with evident devotion, while the mother of the family regards her with attentive eye; the composition is rather stiff and mechanical, but the poor reader's nervous face is painted with great skill. The same artist has another picture, called "The Rural Postman;" the jolly facteur seated at a well-covered table in the kitchen, while the ladies chat with him and the servants laugh in chorus; an excellent bit of comic painting. M. Comte, a well-known artist, contributes a picture of Henry III. during the assassination of the Duke of Guise; the cowardly king listens with his ear close to the door, his face pallid with terror, while two flaring candles throw a lurid glare over the whole; a powerful but very odd composition. M. Gerôme only exhibits two small pictures, "The Slave Market" and "The Dealer in Wearing Apparel, at Cairo," both most carefully-painted and attractive pictures, but not to be ranked with his best works. M. Eugène Giraud presents us with another daring glimpse of "The Opera Ball," treating a hacknied subject with considerable originality, but scarcely succeeding in telling any tale. M. Hamman pays an excellent tribute to Meyerbeer, who is represented as if in the act of composition, while the creations of his art flit like genii around the musician. M. Landelle has a small but admirably-painted work, "Jewish Talebs of Morocco," transcribing the laws of Moses for the synagogues; two figures full of study and character. M. Müller has produced a good picture of Galileo in his captivity, visited by the nobles of Sienna. M. William Wyld, a charming work, entitled "Souvenir of the Bay of Naples."

Such are a few of the more salient points in the Paris Salon of the present year, which has so for-

* Whose name, like that of Meissonnier, does not appear in the catalogue.

midable a rival in that of the Champ de Mars; there is little doubt that the latter has robbed the former of many an ornament, but the salon presents an admirable collection of average French art at the present moment, and therefore deserves careful examination. There is certainly less originality, and at the same time less eccentricity, to be noted than usual, but there is a positive advance in drawing, manipulation, and colouring.

Art in the Paris Universal Exhibition.—The French sculpture may scarcely obtain the attention its high excellence deserves. It does not gain effect by concentration on any one point, but is scattered about as a means of decoration. Yet, collectively, there has seldom been a finer or more instructive display, even in an International Exhibition. These works are worthy of special study on several grounds. First, because no national school is better acquainted with the human figure than the French, or shows more mastery in drawing or modelling. And secondly, because this knowledge of the figure extends itself from the sphere of sculpture proper into the decorative arts generally. Thus, a chief reason why French bronzes are the best in the world is, that French sculpture in marble is decisive in form, sharp in the articulation of a joint, firm in the definition of a muscle. In short, our English artizans will do well to determine, on the evidence furnished by the French courts generally, how far those teachers are right who insist on the study of the figure as a preliminary and groundwork to decorative design. For this end it will be wise to pass from French sculpture to French manufactures, to mark how figures first modelled in the clay have been reproduced in bronze, zinc, iron, or the precious metals; to observe how knowledge of anatomy and a decisive and firm hand are turned to good account in the carving of wood and in the design and decoration of furniture. The best means, perhaps, of arriving at an intelligent understanding of the complex school of French sculpture is through a distinctive classification. It will be well, for example, to examine the 215 figures which constitute the collection under the following heads:—Schools antique, schools romantic, schools naturalistic, and sculpture portraiture. The collection is so far thorough that it will be possible, at the cost of some labour, to determine the strength or the deficiency of modern French sculpture in each of these departments. To enumerate names or mention individual works which are almost wholly unknown in this country would answer no good end. Perhaps it will be more to the purpose to point out what characteristics the student should look for, and what the excellencies or defects he is likely to find. In the revival of the antique it may be said that the French have properly seized on the old severity, and that their decision and firmness in modelling give them in this line a specialty. In their life-size bronzes, in which they naturally recur to Pompeian precedents, they also have a specialty. Some such figures are, perhaps, pushed needlessly into archaicism. Cavelier's "Neophyte" may be quoted as a very perfect example of the adaptation of the antique to modern art. Coming to schools of romance it will possibly be found that the French are surpassed both by the Italians and the English. Baily's "Eve at the Fountain," were it in Paris, would show a purity of sentiment foreign to a French work. Sentiment, it will be seen, the French push rather far; Moreau's "Studiosa" is, however, a figure of tenderness and beauty. It will be discovered that the French are strong in naturalism after its varied forms. "Chactas at the tomb of Atala," by Gruyère, is a novel and striking example of naturalistic sculpture. Capellaro models a "Labourer," suggested by Virgil's "Georgics." Then, Cambos gives, in "La Cigale," an elaborate study of naturalistic drapery. And here it may be recommended that the various styles or treatments of drapery should be noted—the classic, the naturalistic, and the generalized romantic. The exhibition contains fairly good examples of all. The German school of drapery has been known as singularly learned; the paucity of German sculpture is to be lamented. French naturalism is sometimes pushed into the picturesque or grotesque, as in the bronze statue of a "Negro," by Lequesne. Works wherein the whites of the eyes are actually represented by light coloured stone or enamel have been found at Pompeii. Such figures are, generally, not Greek, but late Roman; and the art is poor, not to say corrupt. In busts and portrait-statues the French show their accustomed aptitude. The sculpture, indeed, which is true in naturalism seldom fails in portraiture. Three works in this department specially deserve notice, both for excellence and as distinctive in treatment. Guillaume's "Napoleon I." is essentially statuesque and monumental; severe and stately; Carpeaux's "Prince Imperial," with a dog, deservedly one of the most popular figures in the exhibition, is picturesque; and Thomas's "Mdlle. Mars" is perfect as a statue of costume. Finally, it may be worthy of remark that the mediævalism of sculpture, that the styles which have risen responsive to Gothic revivals, find little place in Paris. The well-known statue of "St. Louis," by Montagny, given by the Emperor to the church of St. Louis d'Antin, partakes of a severity and dignity befitting architectonic sculpture. Also Dubois' striking figures show exceptionally the influence of the middle ages. "Narcissus" is allied to Michael Angelo, "The Infant St. John" to Raphael, and "The Florentine Singer of the 15th century" to Donatello.

Colonies.

Resources of New South Wales.—The Sydney catalogue of the articles sent to the Paris Exhibition is in itself an exposition of the resources of the country. The articles comprise wool, preserved meats, horns, hides, tallow, wheat, barley, oats, tobacco, cotton, wine, flax, silk, sugar, coal, iron, gold, and copper. Wool was the first of the industries of New South Wales, and is still the greatest. Ambitious as the colony is of getting out of the pastoral stage, and becoming a country of manufactures as well a country of shepherds, the limit of pastoral development has not yet been reached. A considerable portion of the interior is still lying waste, and in a few years there will be millions more sheep than now. In the settled districts the land is being enclosed, and it is proved that fenced land carries more sheep than unfenced land. It is impossible to name the quantity of sheep the colony is capable of nourishing. In the quality of the wool produced there is much need for improvement. Those who have paid attention to breeding get more profit from the wool of one sheep than others do from two. Increased care is now being given to breeding for wool. Of late years attention has been paid rather to quantity than quality, and there has been, in consequence, some deterioration in the fineness of the fleece. But the tide is now turning, and an increased number of sheep farmers are paying attention to the quality of their flocks. It is expected, therefore, that an annual improvement will henceforth take place in both quality and quantity of the wool exported.

Railway Statistics in South Australia.—There are now 113¾ miles of railway at work in the colony. The passenger receipts in 1866 were £38,363, and for goods, £75,739; together, £114,102, showing a deficiency, as compared with the receipts of 1865, which amounted to £133,313; total number of passengers in 1866, 358,362. There are 1,582 miles of telegraph lines, and 58 stations in operation. Receipts in 1866, £17,649 for 121,153 messages, against in 1865, £17,041 for 112,344.

Queensland.—The demand for labour in Queensland has now so nearly equalled the supply that Government

have resolved to discontinue the various relief camps that have for months past been at work in the vicinity of Brisbane and Ipswich. Manganese is now reckoned among the products of Queensland; two tons have been shipped at Gladstone *en route* for England. The cultivation of cotton is rapidly extending in Queensland. Four years ago the growth of cotton in this colony was considered an interesting experiment, but few persons expected any practical result would follow. In 1862 14,344 pounds of cotton were exported, valued at £1,423, and in 1865 the quantity had augmented to 612 bales, containing 183,680 lbs. of clean cotton, and during the past year a much larger area of ground was put under cultivation, and the total yield is estimated at about 3,000 bales.

Publications Issued.

A History of the Machine-wrought Hosiery and Lace Manufactures. By William Felkin, F.L.S., F.S.S. (*Longmans*).—The author has done well in putting on record the knowledge which it has taken a lifetime to acquire, a knowledge, too, which scarcely any other man, probably no other man living, possesses. Mr. Felkin has taken advantage of the peculiar opportunities for the acquisition of this knowledge which his long residence in Nottingham has afforded him, and to his industry and capacity for the task the public are indebted for this history of a great staple trade of the country. Mr. Felkin has long been known in connection with the trade of Nottingham; and his efforts in aid of the Exhibition of 1851 are well remembered by all who were engaged in that grand industrial display. He entered the stocking-making business in 1808, and the lace trade in 1819. In each he was called to take an active part, and since 1828 he has occupied a public position in many transactions connected with both until 1864. The knowledge of persons and events thus necessarily acquired, he has often been urged to embody in such a work as the present. He states in his preface that "having been freed from other pressing duties, he has devoted the whole of the seventy-second year of his life to this effort." How laborious has been the task may be judged, when it is borne in mind that it has thrown upon him the giving an account of inventions and patents, which, in numbers and prolixity of specifications, are probably unexampled in any other manufacture, and all of which have had to be investigated. The short notices of these in the patent list issued from the office fills a volume of 1,070 pp. Mr. Felkin's work traces the progress of the machine-wrought hosiery and lace trade from Wm. Lee downwards through Strutt, Heathcote, and a host of others, both foreign and native, who have from time to time added invention after invention, until the perfection to which the manufacture has arrived is little short of miraculous. There is one curious feature in the history of these inventions, viz., that, with the exception of Lee and Strutt, every one of the many English inventors was a working handicraftsman. As regards machine-made lace, it is stated that such is the excellence at which it has now arrived, that certain descriptions defy the keenest observer to distinguish it from the hand-made article. The work is comprised in a goodly octavo volume of 560 pages, and is largely illustrated with wood engravings and lace patterns. It not only enters into the history of the various inventions connected with the manufacture, but treats at length of the social and economic conditions affecting the trade at home and abroad, and furnishes copious statistics of its progress and present position.

Notes.

Preservation of Milk.—Gay-Lussac has proved that milk kept from the air is preserved for a long time perfectly good. Profiting from this experience, M. Mabrun warms milk in a moderate temperature in a tin vessel, furnished with a tube of lead, to expel the air; then the tube is compressed, and the orifice is closed with solder. When the milk is used at the end of several months, it will be found desirable to stir up with it the cream which is formed on the upper part of the liquid. M. Mabrun, having laid this process before the Academy of Sciences for their examination, the committee report that milk thus preserved after six months still possesses all the properties of fresh milk. A prize of 1,500 francs has been awarded to M. Mabrun.

Nicotine in Tobacco.—A Belgian chemist, M. Melsens, who has made numerous communications to the Academy of Sciences, has found that the proportion of nicotine contained in different species of tobacco varies much according to where it is produced. The tobacco grown in France, especially that from the department of Lot, contains about 7·96, or near 8 per cent. of nicotine, whilst from Havannah tobacco only 2 per cent. is found. M. Melsens proposes to smokers, to preserve them from the baneful effects of this alkaloid, to put in the barrel of their pipe or in the cigar-holder a little plug of cotton, impregnated with a mixture of tannic and citric acids. The smoke passing through cotton leaves the nicotine, which combines with the two acids to form tannate and citrate.

Paris Exhibition.—Visits of Teachers.—The following minute has been recently passed by the Committee of Council on Education:—1. In accordance with the practice of the Science and Art Department at the International Exhibitions at Paris in 1855 and in London in 1862, my lords think it desirable to offer encouragement to the masters teaching in schools of science and art to visit the present International Exhibition at Paris, with the view of studying those objects which may be likely to benefit the instruction given in such schools. 2. Their lordships therefore announce to the certificated masters now engaged in giving instruction in schools of science and art connected with the department, that they will pay to each such master or mistress visiting the Paris Exhibition, the sum of five pounds in aid of their expenses, and to each an additional sum of two pounds for any report, or any useful suggestions which any such teacher may make (in respect to his or her duties or teaching) derived from the study of the Exhibition, such report having first been published in any journal, local or otherwise, and afterwards approved by their lordships. 3. And, further, to each of the three best of such reports referring to instruction in science, and to each of the three best reports referring to art, my lords will give respectively the following prizes in addition to the sum above named, namely,—for Science, for the best report, twenty pounds; for the second best report, fifteen pounds; and for the third best report, ten pounds; and the same sums respectively to the three best reports for Art.

MEETINGS FOR THE ENSUING WEEK.

Mon.....Society of Arts, 8. Cantor Lecture. Mr. Hullah, "On Music and Musical Instruments."
Odontological, 8.
Farmers' Club, 5½.
Society of Engineers, 7½. Mr. Vaughan Pendred, "On Water Tube Boilers."
R. United Service Inst., 8½. 1. Capt. G. V. Fosbery, V.C., H.M. Bengal Army, "Explosive Shells applied to Military Purposes." 2. Mr. Evan Hopkins, "On the Demagnetization of Iron Vessels." The process will be shown by means of a model illustrating operations on H.M. ship *Northumberland*.
Royal Inst., 2. General Monthly Meeting.
Entomological, 7.
British Architects, 8. Annual Meeting.
Medical, 8.
Victoria Inst., 8.
Tues ...Civil Engineers, 8. Mr. James T. Chance, "On Optical Apparatus used in Lighthouses."
Pathological, 8.
Ethnological, 8.
Geologists' Assoc., 8.

R. Horticultural, 3. General Meeting.
Royal Inst., 3. Prof. Blackie, "On Plato."
WED ...Society of Arts, 8. Captain O'Hea, "On the Recent Inventions and Improvements in European and American Breech-loading Small-arms."
Geological, 8.
Graphic, 8.
Microscopical, 8. 1. Dr. L. Beale, "On Nutrition from a Microscopical point of view." 2. Dr. L. Beale, "On the Germinal Vesicle of the Ovarium Ova of the Stickleback." 3. Mr. J. H. Brown, "On an Iris Diaphragm."
Literary Fund, 3.
R. Society of Literature, 8½.
Archæological Assoc., 4½. Annual Meeting.
THUR ...Zoological, 8½.
Royal Society Club, 6.
Royal Inst., 3. Prof. Huxley, "Ethnology."
London Inst., 7. Prof. Bentley, "On Botany."
Antiquaries, 8½.
Royal, 8½.
FRI .....Astronomical, 8.
Royal Inst., 8. Prof. Bain, "Correlation of Force in its bearing on Mind."
R. United Service Inst., 3. Captain Cortland H. Simpson, R.N., "His Plan of Sustaining and Lowering Ships' Quarter Boats."
SAT .....Royal Inst., 3. Prof. Huxley, "Ethnology."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 13th April, 1867.

91. Bill—County Treasurers (Ireland).
114. „ National Debt.
190. Duchy of Lancaster—Account.
220. Navy (Corporal Punishments)—Return.
228. New Courts of Justice—Estimate.
Servian Jews—Correspondence.
Public Petitions—Seventeenth Report.

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422. (A IX.) Poor Rates and Pauperism (Return A).

Delivered on 15th April, 1867.

212. Coal Duty (London)—Returns.
218. Spirits—Returns.

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511. Income and Property Tax—Return.

Delivered on 16th April, 1867.

189. Passengers' Baggage (Paris Exhibition)—Further Correspondence.
210. Supplemental Estimates—Account.
219. College of Science (Dublin), &c.—Return.

SESSION 1866.

489. National Debt—Return.

Delivered on 17th April, 1867.

110. Bill—Arrest for Debt Abolition (Ireland).
175. (I.) Savings Banks—Returns.
191. East India (Native Troops)—Minutes.
206. Storm Signals—Memorials.
222. Constabulary (Devon and Somerset)—Return.
221. Constabulary (Cornwall)—Return.
236. Sugar—Return.

Patents.

From Commissioners of Patents' Journal, April 26th.

GRANTS OF PROVISIONAL PROTECTION.

Advertisements, apparatus for exhibiting—1084—J. Dunbar.
Armour plating—1082—T. A. Rochussen.
Bale-fastener—1036—T. H. Lucas.
Blowing engines—1072—A. C. Kirk.
Boats—996—T. Faucheux.
Boilers—756—T. Cowburn.
Boilers—809—J. R. Swann.
Boilers—1028—W. E. Newton.
Bricks—1006—W. Hodson.
Bronzing metallic surfaces—979—J. Storey, W. E. Bickerdike, and W. V. Wilson.
Buckles—1074—R. Couchman.
Butter—218—E. H. G. Monckton.
Cartridges—1002—E. Delessert.
Chlorine—1054—C. F. Claus.
Collars, &c.—612—J. E. Smith.
Cotton gins—1068—A. V. Newton.
Dead bodies, preservation of—1014—W. R. Lake.
Doors—1043—J. Barker.
Fabrics, textile—1088—W. Robertson and J. G. Orchar.
Fibrous substances, treating—1034—W. P. Butchart.
Fire-arms and cartridges—972—J. Lewis and G. Clark.
Fire-arms, breech-loading—3325—J. Macintosh.
Fire bars—1070—W. C. Cambridge.
Fire-extinguisher—1014—E. Casper.
Fire grates—1061—T. Redmayne and J. Sibrey.
Furnaces—1076—S. Barlow and T. Edmeston.
Gas—608—H. Ulliel.
Ice—952—W. E. Newton.
Jacquard machinery—1052—C. E. Brooman.
Milling machines—1004—J. H. Barker.
Motive-power—1008—H. Davey.
Motive-power machinery—984—J. A. Moll.
Oxygen, producing—1040—C. E. Brooman.
Petroleum, &c., burning—998—J. A. Bouck.
Phosphorus—1064—J. H. Player.
Pumps—1026—S. Matthews.
Railway crossings—1012—S. Perkins.
Railway sleepers—1086—H. A. Bonneville.
Railways, &c.—1016—B. Fowler and D. Greig.
Railways, &c.—1056—R. A. Rooney.
Shells, &c.—1050—W. E. Newton.
Smoke-purifier—1058—J. L. Davies.
Spindles, &c.—1030—F. A. Fitton and T. Hall.
Telegraph posts—1048—W. T. Henley.
Telegraph wires—1022—T. B. Marshall.
Thread, &c., winding—1060—A. Morel.
Tubes—753—N. Thompson.
Valve seats—1066—J. R. Napier and W. J. M. Rankine.
Vermin traps—1080—W. Clark.
Wearing apparel—1020—S. Leather.
Weighing-machines, &c.—584—R. Wilson and W. H. Bailey.
Whetstone—1000—G. E. V. Derburgh.
Wire—1049—W. T. Henley.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Bricks—1078—W. R. Lake.
Furnaces—1153—W. Harrison.

PATENTS SEALED.

2758. D. McDermid.
2771. J. H. Gresham.
2774. F. Crossley.
2782. C. Tiffin.
2788. C. McBeath.
2790. J. H. Johnson.
2793. E. Alexandre.
2796. P. Adie.
2797. J. Hunter.
2799. H. Wedekind.
2802. J. Varley.
2808. H. M. Nicholls.
2833. J. Becker.
2835. M. Pollack.
2838. J. Deas and R. C. Rapier.
2848. F. A. Calvert.
2874. J. H. Johnson.
2941. R. Lakin and J. Wain.
2943. J. H. Johnson.
2944. J. H. Johnson.
2952. D. Murray.
2956. J. Bentley & W. Hampson.
2967. W. S. Macdonald.
3129. H. Timmins.
3169. M. A. F. Mennons.
3232. T. Gray.
3320. F. N. Meixner.
3449. C. F. Flach.
8. G. B. Woodruff and G. Browning.
78. M. H. Simpson.
400. J. Westwood and R. Baillie.
401. J. Westwood and R. Baillie.
504. I. M. Milbank.
613. G. Haseltine.
2785. M. and A. D. Hopkins.
2798. J. H. Johnson.
2814. W. Robertson.
2815. J. Dodd.
2816. J. Scott.
2818. J. Scott.
2820. J. Keighley.
2822. R. Holden.
2829. T. Henderson.
2830. J. Jackson.
2854. R. McTaggart and J. Holdforth.
2911. R. J. Edwards.
354. H. E. Falk.

From Commissioners of Patents' Journal, April 30th.

PATENTS SEALED.

2832. E. Tavernier and H. W. Whitehead.
2834. H. R. J. Denton.
2844. R. Porter.
2846. O. C. Edwards.
2847. J. Harris.
2850. R. J. Gay.
2858. F. Claudet.
2861. M. Chamberlain.
2863. J. S. Gisborne.
2865. T. D. Clapham.
2866. C. E. Brooman.
2873. N. F. Taylor.
2878. T. Hunt.
2880. C. E. Spagnoletti.
2887. W. Humphrey.
2888. J. Shaw.
2901. C. Sutton.
2914. T. Horsley & G. Knighton
2919. W. Cassap.
2946. W. Clark.
2960. A. Hawkins.
2964. L. Brierley.
2978. J. Whitehead.
3034. T. Greenwood.
3073. W. R. Lake.
3228. W. Clark.
3308. W. Clark.
3405. W. Clark.
46. W. E. Newton.
237. P. Jack and A. Coulthurst.
248. T. C. Entwistle.
425. J. Lamble.
544. S. Butler.
550. A. V. Newton.
570. A. V. Newton.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

1012. G. Davies.
1261. G. Homfray.
1039. H. Marsden.
1048. F. Bush.
1108. A. V. Newton.
1214. G. T. Bousfield.
1076. R. H. Smithett and J. Davidson.
1072. T. G. Ghislin.
1095. R. A. Rrooman.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

1226. W. Geeves.
1017. E. Hillam & R. R. Wilson.
1083. H. Rawson.
1039. H. T. Green and S. B. Wright.
1064. J. Bullough.

Journal of the Society of Arts.

FRIDAY, MAY 10, 1867.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'Clock:—

May 15.—"On New Machinery for Cutting, Tunneling, Quarrying, and Facing Slate, Stone, and Marbles." By W. Fothergill Cooke, Esq.

May 22, Derby-day.—*No meeting.*

Cantor Lectures.

The concluding lectures of Mr. Chaffers' course, "On Pottery and Porcelain," will be delivered as follows:—

Lecture VI.—Monday, May 13th.

English Pottery.—Fulham—Lambeth—Yorkshire—Shropshire—Liverpool—Staffordshire—Etruria—Wedgwood's Wares, &c.

Lecture VII.—Monday, May 20th.

English Porcelain.—Bow—Chelsea—Derby—Worcester—Liverpool—Wales—Plymouth—Bristol—Lowestoft—and other Manufactories—Battersea Enamel, &c.

The lectures commence at eight o'clock, and are open to members, each of whom has the privilege of introducing one friend.

Conversazione.

The Council have arranged for a Conversazione on Thursday evening, the 23rd May, at the South Kensington Museum, cards for which will shortly be issued.

Artizans' Visits to Paris.

The Council of the Society of Arts, feeling the importance of promoting the intelligent study of the Paris Exhibition and the manufacturing establishments in France by artisans of the United Kingdom, have appointed a Committee in furtherance of this object. The following gentlemen constitute the Committee:—

Rt. Hon. C. B. Adderley, M.P.
C. W. Aitken.
Edward Akroyd, M.P., *Vice-Pres.*
Sir Wm. G. Armstrong, C.B.
A. S. Ayrton, M.P.
S. A. Beaumont.
John Bell, *Memb. of Council.*
Professor Bentley, *Memb. of Council.*
Lord Berners, *Vice-Pres.*
Hon. and Rev. S. Best.
D. Roberton Blaine, *Memb. of Council.*
W. H. Bodkin (Assistant-Judge), *Vice-Pres.*
Sir J. P. Boileau, Bart., *Vice-Pres.*
R. K. Bowley.
Antonio Brady.
Rt. Hon. H. A. Bruce, M.P.
Decimus Burton.
C. Buxton, M.P.
The Earl of Caithness, *Vice-Pres.*
Lord Eustace Cecil, M.P.
R. L. Chance.
Harry Chester, *Vice-Pres.*
The Masters of the City Companies.
Henry Cole, C.B., *Vice-Pres.*
Robt. Coningsby.
Rt. Hon. W. Cowper, M.P.
Sir Francis Crossley, Bart., M.P.
J. Bailey Denton, *Memb. of Council.*
Lord de l'Isle and Dudley, *Vice-Pres.*
The Duke of Devonshire.
Charles Dickens.
James Easton, *Memb. of Council.*
C. W. Eborall.
Lord Ebury.
Lord Elcho, M.P.
William Fairbairn, F.R.S.
Professor Fawcett, M.P.
Peter Graham, *Memb. of Council.*
The Earl Granville, K.G., F.R.S., *Vice-Pres.*
The Earl Grosvenor.
Mr. Hansard.
G. W. Hastings.
Wm. Hawes, F.G.S., *Vice-Pres.*
J. Pope Hennessy.
Sir Rowland Hill, K.C.B.
Chandos Wren Hoskyns, *Vice-Pres.*
T. Hughes, M.P.
Blanchard Jerrold.
Rev. C. Kingsley.
Hon. A. F. Kinnaird, M.P.
Lord Henry G. Lennox, M.P., *Vice-Pres.*
The Bishop of London.
The Sheriffs of London and Middlesex.
Rt. Hon. Robt. Lowe, M.P.
Lord Lyttelton, *Vice-Pres.*
Archbishop Manning.
Henry Maudslay, *Memb. of Council.*
Rev. F. D. Maurice.
The Lord Mayor.
J. Stuart Mill, M.P.
Rev. Dr. Miller.
The Bishop of Oxford.
J. Slaney Pakington, *Memb. of Council.*
Right Hon. Sir John S. Pakington, Bart., M.P., *Vice-Pres.*
Alderman Sir B. S. Phillips.
Sir Thomas Phillips, Q.C., F.G.S., *Vice-Pres., Chairman of the Council.*
The Duke of Richmond.
Rev. W. Rogers.
The Marquis of Salisbury, K.G., *Vice-Pres.*
Titus Salt.
Sir Francis Sandford, *Vice-Pres.*
Colonel Scott, R.E., *Memb. of Council.*
The Earl of Shaftesbury.
Benjamin Shaw, *Memb. of Council.*
Sir J. P. Kay Shuttleworth, Bart., *Vice-Pres.*
S. Smiles.
Seymour Teulon, *Treasurer.*
Thomas Twining, *Vice-Pres.*
Alderman Waterlow, *Memb. of Council.*
E. W. Watkin, M.P.
G. Watts.
George F. Wilson, F.R.S., *Memb. of Council.*
Vice-Chancellor Sir Wm. Page Wood, F.R.S., *Vice-Pres.*

The Council, on the recommendation of the Committee, have passed the following minute:—

At the last and former International Exhibitions held in this country, arrangements were made by the French Government to facilitate the visits of skilled artizans, and interesting reports on the exhibitions were made by them to their government. Believing that such visits on the part of skilled workmen to these great international displays not only exercise a beneficial influence upon the men themselves, but also upon the progress of industry in the country to which they belong, the Council of the Society of Arts have resolved to raise a fund to be employed in aiding a limited number of English workmen to proceed to Paris for the purpose of studying the present French Exhibition.

To carry this object into effect, they have agreed on the following plan:—

1st. That a number of selected workmen (the number to depend on the amount of funds at the disposal of the Council) shall be assisted to proceed to and remain in Paris a sufficient time (say three weeks), for the purpose of making a careful study of the exhibition, and of such factories and workshops as they may desire to visit.

2nd. That every man so assisted shall, on his return, make a report to the Society of what he has observed during his stay, in reference to the special industry in which he is engaged, and that it be made a condition of the grant to each man that one-third of the amount be retained until his report shall be supplied to the Society.

3rd. The Council think it will be undesirable to fix the exact time for, or to prescribe the duration of, these visits, or to interfere with any of the arrangements the

men may desire to make for their own accommodation; but, in order that they may take advantage of the facilities provided by the Commission organised by the French Government for the study of the exhibition, the men will be placed in communication with that Commission on their arrival in Paris.

4th. A considerable sum will be required satisfactorily to accomplish the important object undertaken by the Society, and, in order to raise these funds, the Council have determined to appeal to the members of the Society, who must be interested in the successful results of this movement, in the belief that they will not hesitate to join in a subscription for the furtherance of the undertaking; and they propose at the same time to communicate with the various Chambers of Commerce, inviting their counsel and support. The Council have decided to commence the subscription by a vote of one hundred guineas from the funds of the Society.

Members are invited to aid the Council in this undertaking by subscriptions, which should be forwarded to the Financial Officer at the Society's house.

Harvesting of Corn in Wet Weather.

The Council of the Society of Arts have resolved to offer the Gold Medal of the Society, and a Prize of Fifty Guineas, for the best Essay on the Harvesting of Corn in Wet Seasons.

The first part of such essay—after noticing the various systems at present adopted in damp climates for counteracting the effects of moisture upon cut corn in the field, and for avoiding such exposure in wet seasons by peculiar harvesting processes—should furnish a practical and analytic exposition of the best available means:—

1st. Whereby cut corn may be protected from rain in the field.
2nd. Whereby standing corn may, in wet seasons, be cut and carried, for drying by artificial process.
3rd. Whereby corn so harvested may be dried by means of ventilation, hot air, or other methods; with suggestions for the storage both in the ear and after threshing.
4th. Whereby corn, sprouted, or otherwise injured, by wet, may be best treated for grinding or feeding purposes.

The whole to be supplemented by a statement of practical results, and actual cost of each system described; and authenticated estimates of any process proposed for adoption, based upon existing but incomplete experiments.

The above requisitions are given suggestively; not to bind the writer to the order or to limit the treatment of the subject, provided it be kept within the scope of practical experience and utility.

The essays must be sent in to the Secretary of the Society of Arts on or before the 1st of January, 1868.

The Council reserve the power to withhold the whole or part of the prize, in the event of no essay being, in the opinion of the judges, of sufficient merit.

Subscriptions.

The Lady-day subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Food Committee.

A meeting of the General Committee on the Food of the People was held on the 11th April. Present—Mr. Benjamin Shaw in the chair: Mr. J. Caird, Mr. Harry Chester, Mr. C. Wren Hoskyns, Lord de L'Isle, Mr. Clare S. Read, M.P., Mr. E. C. Tufnell, and Professor John Wilson.

Professor Wilson laid before the Committee the following information on the subject of bread-food and the nutritive properties of wheat, more especially with reference to a system of grinding and dressing corn and the process of panification which had resulted from the investigations of M. Mège-Mouriés, of Paris. Previously to so doing, Professor Wilson called the attention of the Committee to a diagram of a section of a grain of wheat greatly magnified, showing the disposition of the outer ligneous envelopes and the internal cellular tissues in a very distinct manner. Professor Wilson stated that he need not go into the question, which everyone present no doubt understood, as to the different properties of alimentary substances, which might be divided into two classes—one which subserves the plastic purposes of the body, and the other which subserves the respiratory process generally; and that for healthy life these must be had in definite proportions, these proportions being about six of the respiratory aliment to one of the other; wheat, better than any other grain, possesses those two alimentary principles in the proper proportions; consequently wheat has been generally looked upon as the bread corn of all civilized nations; as people progress in civilization they give up the old barley and rye, and employ wheat solely for that purpose. About twelve years ago (1853-54) M. Mège-Mouriés directed his attention to the composition of the grain of wheat, and to the processes of grinding and of panification, and the results he obtained were sufficiently important to form the subject of a report, which was presented to the Academy of Science by M. Chevreul, in 1857. The object of M. Mouriés' investigation was to show the defective knowledge and the waste of material in the ordinary practices of the trade; but, although these were fully proved by his results, there appeared to be trade and other difficulties in the way of its general adoption; for, with the exception of some of the large public establishments in Paris, including the Ecole Polytechnique, the Ecole Normale, and the Lycée St. Louis, where it was carried out with marked success and advantage, no good has practically resulted from the principles he so ably marked out and made known to us. In the summer of 1865, while acting as juror on food substances at the Dublin Exhibition, Professor Wilson's attention was recalled to the subject by an article which was exhibited under the name of "Cerealine," and purported to be a preparation of wheat flour by the process indicated by M. Mège-Mouriés. On examination this preparation replied to the tests in a very satisfactory manner, so much so, indeed, as to induce them to verify them by a determination of the nitrogen it contained. This confirmed the opinion they had previously formed of its food value. On further inquiry he found that a simple mechanical process had been devised in the United States, (where, indeed, the flour exhibited had been prepared) for effecting the most difficult part of M. Mouriés' process—that of decorticating the grain. This renders the operation of preparation so easy and so inexpensive as to make it desirable that attention should again be called to M. Mouries' process, for, besides being far more philosophical, it unquestionably effects a large saving in a food point of view, as compared with

the ordinary practice of mealing. Before describing M. Mouriés' process it may be well, for the purposes of comparison, to give in a few words a rough outline of the ordinary process of grinding, breadmaking, &c. The wheat is taken in its natural state and submitted to the friction of two stones between which it is placed. It is then passed through sieves for the purpose of—1st, separating the bran from the flour; and, 2nd, of separating the finer from the coarser portions of the flour. We thus have three principal divisions; the two latter again are sometimes further separated, and various names—boxings, sharps, &c.—given to them. The bran averages from 14 to 15 per cent. of the whole weight, the relative proportions of the residue vary according to the differences of separation. In examining the composition of the grain of wheat, M. Mège-Mouriés found that it was a far more complicated structure than was commonly understood. This structure consists—1st, of an outer covering or epidermis; 2nd, epicarp; 3rd, endocarp; and that these three layers consist chiefly of ligneous tissue, and form the extreme covering or true bran. Together they average from 2 to 3 per cent. of the weight of the wheat. The three outer, or ligneous tissues, are valueless for food. They contain a certain amount of nitrogen, but are indigestible; and are not only valueless as food, but do harm as local irritants. These are distinct from the ordinary bran of the mealing process. Beneath these come, 4th, the "testa," or seed coat proper, which is a distinct cellular tissue of a dark colour, yellow or orange, according to the description of the grain. Next to that comes the embryonic membrane, directly connected with the germ, which indeed it supplies as soon as the vital processes of growth are excited. These two enveloping membranes contain nitrogenous principles in larger proportion than the interior portions of the grain; and as we go from the exterior coverings to the centre and follow the starch granules, the amount of nitrogenous compounds diminishes. The ordinary bran not only consists of the "epidermis," or true bran, but also contains the whole of the nitrogenised tissues enveloping the starch granules, and always a certain proportion of them also. Indeed, it has been found commercially profitable to purchase bran and separate the starch or flour from it; from 5 to 6 per cent. of flour are thus often obtained. As already stated, the ordinary bran averages from 14 to 16 per cent. of the weight of the wheat. It is the same in the case of the potatoe. We throw away a good deal of valuable food in the peeling of potatoes. We ought only to remove the epidermis. Simple experiment shows that.

Mr. Read inquired whether the same remark applied equally to linseed?

Professor Wilson thought that the same law would hold good in all similar vegetable structures. Linseed does not contain starch, but the cells contain oil instead. The nitrogenous compounds do not exist in the starch granules, but they envelop them. As you approach the centre of the wheat grain the starch cells do not contain so much nitrogenous compound as the other tissues. He might further state that the embryonic memb. plays the most important part, both in alimentation and germination. That is the active agent of decomposition during the process of panification. The outer covering of wheat when immersed in water speedily becomes saturated with water, but if Na Cl. (salt) be added, the solution only penetrates so far as this membrane, where it is arrested. These two inner tissues contain nitrogen in large proportions, and envelope the mass of starch cells which form the body of the grain. Ordinary flour is composed entirely of these interior starch cells, the remaining portions of the grain being separated in the shape of bran, and carrying away with them at the same time a proportion—generally 5 or 6 per cent. of the flour also. M. Mouriés found that the proportion of nitrogenous compounds in the grain was very unequally divided; that while in the epidermis proper it was least, it existed in larger proportions in the two next layers than it did in the starch cells or flour of the interior, and, consequently, if we would preserve the maximum food properties of the grain, we must return and combine those two layers with the flour, and not waste them by separation with the bran. In the starch cells or flour too the nitrogen was found to diminish towards the centre of the grain, where it was at its minimum, and where of course the flour, though finer and whiter, has the least nutritive value. This is known practically by the fact that the finest wheat flour will not combine with so large a proportion of water in breadmaking as the second quality will, though it may not be so well known that the cause is due to the smaller proportion of gluten present. It has been found by experiment that the finest flour will not take up more than 20 per cent. of water, known as *pain blanc*; that the second quality will take up 30 per cent., *pain de gruaux*; while the third quality, with which a portion of the ordinary bran is always mixed, will take up 40 per cent. *pain bis*. M. Mouriés, therefore, recommends that the grain should be merely decorticated previous to grinding, and that the layers of cells, so rich in gluten as the testa and embryo membrane, shall be ground up with the starch cells, and form part of the flour used for bread and other food purposes. The bread thus made absorbs more water, rises from 20 to 30 per cent. more, and is more nutritive as well as digestible. Gluten is the nitrogenous property of the wheat, and by the greater absorption of water by the flour in which it is present, weight for weight of flour there is a gain, in the greater number of loaves produced from a given weight of flour, and that would be the baker's inducement to try this process. It would be at the same time more nutritious, owing to the greater proportion of nitrogenous matter the loaves contain. The loaves will contain more water, but the extra proportion of nitrogenous compounds will counter-balance that. One hundred parts of flour of this sort will make say 140 loaves, whereas 100 parts of the other flour would only make 100, and every one of the 140 would be more nutritious than the other. This process may be said to add 60 per cent. to the nutritive value of the flour, while the bulk is only increased 40 per cent.

Mr. Caird inquired whether any difference was found to exist in this respect, according to the description of wheat,—red or white, and that sown in spring and autumn?

Professor Wilson replied, within an extremely limited range; all descriptions being subject to the same laws. There was, no doubt, a difference in the varieties of wheat and soil, and the period of sowing, whether spring or autumn, but the range was too limited to be of the slightest importance. He did not think that was a question which need be considered now. The true bran, according to M. Mouriés, consists of only the outer coverings, the ligneous tissues, which represent three to four per cent. of the whole. He was only speaking of the wheat as it is in the market; and as we are told we shall probably require 8,000,000 quarters of foreign wheat, it is a matter of vast importance to utilise the grain to the utmost extent it admits of. There is another point of importance in connexion with M. Mouriés' process, in regard to the storage and preservation of wheat. It appears that the outer covering—epidermis—absorbs moisture far more readily than the regular cellular tissues of the inner layers, and this renders the grain more or less liable to mould, and other injuries, unless great care be taken by occasional shifting, &c. If you soak wheat grains in water, you will find that the water is readily absorbed by the outer or ligneous tissues, and when you come to the inner tissue there is no longer the same tendency to absorb, consequently, if you moisten the outside surface, and rub it gently, you will rub these tissues off the grain, and the grain will come out in this shape [producing speci-

mens of decorticated grain]. That is, the absorbent envelopes will be taken off, and nothing will remain but the cellular tissues, and in that state wheat may be kept stored for any length of time without its quality being impaired.

Mr. Chester asked if this had been proved by any experiment on a large scale.

Professor Wilson—It has been so stated; but I should not be satisfied without further trial, because a great deal of information on the subject has been taken from American sources. The theory is correct with regard to the keeping properties of wheat, the decorticating process needs further proof. On the Continent this question is more important, where they have government stores of wheat to last for twelve months, whereas we have free markets. When the wheat is decorticated it can be kept for years without a chance of mustiness or mould getting on it. He would give the Committee the relative values of these different preparations [referring to samples on the table], assuming that the proportion of nitrogenous compounds determines the nutritive value, and that is what we usually go upon. This sample of true bran or epidermis was taken from a very coarse sample of red wheat, and no doubt it exists in larger proportions than in the finer samples of wheat. The true bran contained 4·571 of nitrogenous compounds, the ordinary bran of the market contained 15·019. These analyses were all carried out last winter in Edinburgh. Of ordinary market flour he got three samples, and made an analysis of each, and he found they contained on an average 9·795 whereas the flour prepared by M. Mouriés' process contained 15·672 per cent. of nitrogenous compounds, showing an excess in nutritive value of 60 per cent. over the ordinary flour. The average proportion of bran is 14 to 15 per cent., while by M. Mouriés' process it is only from 3 to 4 per cent.; we thus have a result of 10 per cent. addition in weight and 60 per. cent. more of nutritive properties than by the old process, and at the same time we deprive the wheat of those portions which render it not so well able to be kept. As he had already stated, wheat, by this process of decortication, has less affinity for moisture, and may be stored with less risk. The flour contains more gluten, absorbs more water in panification, and makes more bread, which retains its freshness. All smut and other dirt from insects or otherwise is removed, and the phosphates as well as gluten are preserved. The gluten obtained in starch manufacture has been utilised by mixing it up into bread with ordinary flour, and thus greatly improving its quality. In this case, the same result is obtained by simply not losing it in the ordinary bran. M. Mouriés' plan has, in fact, more nutritive value than the actual whole wheat, because you take away this three or four per cent. of what is no good whatever, and the 96 per cent. left behind contains a higher per centage of nutritive value than the whole wheat does. Thus it appeared to him that M. Mouriés' process increases the quantity of food material obtained from wheat by at least 10 per cent., because here we have only four per cent. of valueless matter, while in the ordinary process we have 14 per cent., so that we get an improved quantity of 10 per cent., and when we come to the manufacture of the flour we get an improvement of 60 per cent. upon the value. M. Mouriés' flour was found to be equal to 15½, whereas the ordinary flour was equal to only 9¾. The grain would weigh heavier, bulk for bulk, after decortication, as it would pack closer, owing to the smoothness of the surface. We find that the nearer wheat assumes the form of a sphere, the heavier it is per bushel, and the specific gravity of the grain is a market test of its quality. Chidham wheat is heavier than Talavera wheat, and yet the latter usually fetches a higher price in the market. A bushel of Talavera wheat weighs about 65 lbs., while the same quantity of Chidham wheat weighs from 65 to 68 lbs. That is determined chiefly by the shape of the particles. No doubt by this process the shape of the grain is altered, because in wheat in its natural state there is always a little beardy roughness, which, though invisible to the naked eye, exists, and increases the tendency to fermentation when affected by moisture, and also prevents the particles lying so close together; therefore, he should say a bushel of decorticated wheat would weigh 5 lbs. or 6 lbs. heavier than ordinary wheat.

Mr. Read asked what was the commercial value of the epidermis?

Professor Wilson replied *nil;* it was only fit to be put on the manure heap. When given in food it was injurious rather than otherwise, it was so sparingly digestible. If moistened it fermented, and became sour in a few hours. The ordinary bran would not do so; this bran would act as an irritant on the stomach.

Mr. Read—Practically, by this process, you get a reduction of a substance which is of no value whatever as food?

Professor Wilson—Precisely so: whereas the other portions of the bran are of higher food value than the ordinary flour itself.

Mr. Read observed, with regard to the commercial value of the bad portions of the grain. The price of flour for the last ten years averaged 1s. 3d. per stone, while the price of bran was 9d.; therefore, though the latter was lost to the human race, it was not lost to the animal world, because it took the place sometimes of wheat meal when it was cheap relatively to other grain in the feeding of animals.

Professor Wilson—We are now looking to the higher class of animals, viz.—ourselves. Every wise feeder of animals, if he can get bran at a low price, will make use of it.

Mr. Chester inquired whether the ligneous portion of the bran was valuable for animals.

Professor Wilson replied that the animal organisation was better adapted for it than our own. They got rid of it easy enough. An animal, out of 14 lbs. of ordinary bran, would appropriate 10 lbs., and 4 lbs. would be expelled in the shape of manure. The ruminating process could not convert this into food value at all. Professor Wilson then proceeded to describe the process of decortication as follows: The wheat, he said, is carried up to the topmost floor, then passing through a screen, or riddle, it falls through a hopper into a long narrow trough which contains water, and is traversed through its length by an Archimedean screw. This carries the wheat slowly along the trough to the discharge end, where it now, in a moistened state, falls down a tube to the unbranning or decorticating cylinders. These are formed of cylinders of cast iron, ridged on the interior diameters, and with closed ends. A screw shaft traverses the centre of them, carrying broad arms, or floats, set at an angle diagonal or "aslant" to the face of the cylinder, and with a diameter so much less than that as to cause friction, but to allow the grain to pass without crushing. A rapid rotation is given to this central shaft, and, owing to the angle at which the floats are set, a slight progressive motion is given to the grain. The friction causes a large proportion of the true bran—epidermis, epicarp, &c.,—to be separated, and this is removed as it is separated by a blast driven through the cylinder in a direction contrary to the motion of the shaft, which also has the effect of drying the excess of moisture of the grain. The grain then passes along a spout into a second cylinder, where it undergoes the same process, and finally is carried into the drying chambers, composed of a series of iron troughs, along which it is propelled by screw shafts, a current of warm air being driven along them in an opposite direction. It then, being dry, receives its last friction in the polishing cylinders, where the friction is applied to the surface of the grains themselves, which are left in a dry, smooth, rounded form. As this generates a considerable elevation of temperature, the grain requires to undergo a cooling process before storing or using. This is effected by carrying

it up to the upper floor, and allowing it to fall down inclined planes through a flat shallow shoot, up which a blast of cold air is driven. With regard to the grinding of this prepared wheat, there are some advantages over the old system. In ordinary grinding, Professor Wilson continued, there is always a mechanical difficulty in arranging the stones. The aim of the miller is always to produce the best flour, and he has to grind it in such a manner as not to crush and cake the meal, not to allow it to heat between the stones, but to granulate it perfectly and evenly throughout, giving it the wiry feel characteristic of No. 1 flour. If set too close, or if the stones be dull, the flour cells are crushed rather than granulated; it has a soft, unctuous feel, and is then termed "killed." In that state it never mixes well, will never work up properly, or rise well in the oven. If the stones be too keen or sharp they are apt to shave and cut up the bran into fine scales, which speck the flour. Therefore, the successful miller has to steer between dull bran with deadness and sharp bran with speckiness. By this process the true bran (epidermis) is all removed, and the stones have to act on a gluten surface and not on the bran, and consequently the latter risk is avoided. In baking, care should be taken not let the dough stand too long, as is frequently done, and not to have the oven too hot at starting. The bread rises 25 to 30 per cent. more than when made with the ordinary flour, and if the heat is too great at first the crust hardens, and the panification forces the loaf out of shape. This process adds at least 10 per cent. to the weight of the food portion of wheat, while it increases the nutritive value of the flour about 60 per cent. These proportions in all probability admit of some modification, as the flour and the bran of the ordinary process of mealing were obtained in the market, while the flour and bran of M. Mouriés' process were, no doubt, obtained from a finer description of wheat than that grown in our climate. This, upon the wheat consumption of the kingdom—say, 20,000,000 of quarters—is a matter of considerable importance. By this process you get a large increase of food value, but you do not get the white bread which is so universally eaten in this country.

Mr. Chester inquired whether Professor Wilson could give any practical suggestion to the Committee whereby the process could be brought into notice, and whether he was aware of any public establishment, in any part of the country, where, on the advantages of the process being demonstrated, it was possible a trial of it might be induced?

Professor Wilson replied that he was not prepared with any suggestion at the moment. It was hardly a matter for private enterprise. It was a matter which might be represented to the Government or the Poor-law Board. There was no gainsaying the advantages that were derived from the process; and it might be put to them whether it was worth their while to direct a trial of it in some of the poorhouse establishments. The decorticating machinery would not be very expensive. In the first instance public prejudice to this flour would have to be overcome; he feared that it would take some time to bring the flour into favour with the lower classes, who have a proverbial preference for very white flour.

Mr. Wren Hoskyns inquired whether flour prepared by this processs was cheaper than the ordinary fine flour?

Professor Wilson replied of course it would be, because ten per cent. increase in the quantity would more than cover the expense of the manufacture: but he rather looked upon it as the improvement in nutritive value. As he had already stated, it was computed that we should require this year foreign supplies amounting to eight millions of quarters of corn, whereas five millions of quarters treated by M. Mouriés' process would be equal in food-value to eight millions treated in the ordinary way. He added that he was thoroughly satisfied with the philosophy of the subject that it was sound, and it was owing to the circumstance of his acting as a juror on food substances at the Dublin Exhibition that his attention was called to it by seeing some of this article, the value of which the Americans were keen enough to recognise.

Cantor Lectures.

"On Music and Musical Instruments." By John Hullah, Esq.

Lecture VIII.—Monday, May 6.

Modern Instruments, Chamber and Orchestral.

Mr. Hullah concluded his (extended) course of lectures on Monday, the 6th inst. The last three, he reminded his audience, had been devoted to the construction and history of musical instruments. It had been seen that all modes of producing musical sound but one—the abrasion or friction of strings—were very ancient, and that every material now used in the making of instruments had been used from the earliest times. The material last applied to the production of sound—hair—had proved incomparably the most important; without the bow, music such as we now have would never have been conceived, nor could it have been executed if it had been. It must not be thought, however, that all ancient instruments were identical in size and shape with their present representatives. On the contrary, these latter had been the subjects of unceasing experiment and repeated change, down to certain epochs at which, for a time, these sizes and shapes had been fixed, by being reconciled with some natural law, by their real or apparent perfection, or by the composition for them of music in such quantity and of such merit as to ensure them against such further modification as would interfere with the execution of that music. In the last lecture it had been shown that the key-board of the 14th century could not have been essentially different in its proportions from the key-board of to-day, unless it could also be shown that the human hand had undergone some great modification. So with the holes of the flute or oboe, the strings of the harp, the frets of the guitar, all of which must be brought within easy reach of fingers of average length. But instruments may easily satisfy this condition and still be far from perfection; and, until any serious inconveniences attending their use could be overcome, it was not likely that they would inspire those who wrote for them with fresh or beautiful thoughts. The instrument has of necessity always preceded the performer, and the performer the music for the instrument; otherwise, the production of good vocal music would not have anticipated by so many generations that of instrumental. Musical instruments have decreased in number as they have improved in quality. As the performers on those of the same species have attained greater skill, the necessity for so many and such slight varieties of them has become less. The oboe and the bassoon represent, in the modern orchestra, a large number of ancient instruments of like construction; and the chest of viols of the 17th century has been replaced by the violin, the viola, and the violoncello, all of which have been extended in compass as well as in general capability. In the race of improvement the bowed instruments, the last to come into the field, have taken and kept the lead. They have also given birth to the earliest great players, and the earliest good instrumental music—evidence, which can need no commentary, of their supremacy in quality, flexibility, and power of expression. The time and place of birth of the first violin proper is still a matter of doubt. The makers of bowed instruments, in the 16th and even in the 17th centuries, did not limit the exercise of their skill exclusively to them, still less to any particular specimens of them. They made viols of all shapes and sizes, long after they had begun to make real violins; and not only these, but guitars, harps, and lutes. So little was the supremacy of the violin recognised, that the makers of stringed

instruments took their name from one now almost extinct —the lute. To this day a continental violin maker is called a *luthier*. The question of the origin of the violin had been complicated by the practice of refitting old viols with new finger-boards, and stringing them afresh. Who made the first violin proper is a question likely to remain without a satisfactory answer; but that it was made somewhere in the north of Italy, and at some time in the second half of the 16th century, is pretty certain. During the first half of that century many excellent luthiers flourished in the north of Italy. One, a native of the Italian Tyrol—Duiffoprugar, set up in Bologna in 1510. Some violins and violas extant bear his name, but closer examination has proved them to be altered and refitted viols. A little later many luthiers settled in Brescia; so many, indeed, that the school of Brescia soon attained an individual reputation. Indeed, it is likely that the violin proper is a native of Brescia,—not less renowned for *virtus* than *virtù*, for no city has contributed, by the valour of its citizens, more effectually to the recent recovery by Italy of a place among nations than Brescia. In Brescia lived, from 1560 to 1610, the celebrated Gasparo di Salo; and, a little later, Magini, a native of Brescia. But the School of Brescia is most renowned for its pupils and offshoots; since Andrea Amati was one of the former, and the school of Cremona one of the latter. Through the labours of this ingenious artist, his sons, Geronimo and Antonio, his grandson, Nicolo, his great-grandson, another Geronimo. and his and their pupils, Guarnerius and Straduarius, Cremona and the violin became literally interchangeable terms. During a great part of the 17th century, notwithstanding the now uncontested superiority of the violin, the viol family still maintained a certain position in the musical world; but towards the end of the century that position ceased to be tenable; and from that time composers and performers have worked exclusively for and with the perfect instruments which already were, and indeed had long been, at their disposal. The violin, viola, and violoncello — varieties in size only of the same instrument—have replaced the whole tribe of viole da braccio and da gamba; and to them has been added a still larger and deeper instrument, the contra-basso or double bass, which again has replaced the violone. From the identity of form of these instruments results a similarity of quality highly favourable to their combination; and this, added to their capability of perfect intonation, approximates them more closely than any other species of instrument to the human voice. No doubt their predecessors, the viols, were often played in tune, and often sounded homogeneous. The superiority of the modern violin lies in its power, quality, and flexibility, which are due to its outline, proportions, and material, to the smaller number, greater thickness, and increased tension of its strings, and to the different form and greater strength of the bow applied to them. The increased arch of the bridge (combined with the *échancrures*), while it has made the violin less available as an instrument of harmony than most of its predecessors, has given it a power and a freedom as an instrument of melody to which none of them could lay claim. In fact, the violin family seems to have attained, in the second half of the 16th century, a perfection beyond which it would seem undesirable and impossible to carry it. The modern orchestra includes all the most important varieties of the two great tribes of instruments—wind and stringed. The violin family represents almost exclusively the latter tribe. The wind instruments are of two species, those of wood and those of brass; and of each of these there are several varieties. Of the wood instruments, the flute only is a simple pipe; the clarionet, oboe, and bassoon being reed instruments. Of the brass instruments, the trumpet and horn are, in their simplest form, mere tubes, the scales of which are limited to the notes of the harmonic chord. The trombone differs from the trumpet and horn, not only in quality but in mechanism, being a brass tube, the length of which is capable of considerable extension. The slide by which this is effected has been of late years applied to the trumpet; and valves, answering a like purpose, have been also applied to the horn. Both these inventions, however, though they afford great facility to the performer, take something from the resonance of the instruments; and their adoption has considerably altered their quality, and is gradually altering the character of the passages written for them. None of these instruments can yet be said to have attained to the status of the violin family. Perfect intonation upon them seems only attainable by persons specially gifted. So difficult is it to the clarionet player, that he is always provided with three instruments, which he uses in their turn for different scales and sets of scales. Considerable inconveniences result from this multiplication of instruments, the most important of which is the impossibility of keeping them at the same temperature, and therefore at the same pitch. This particular inconvenience is limited to the clarionet. One flute, one oboe, and one bassoon are severally used for all keys. In intonation the flute, the most popular and easiest of those instruments, is the most often in fault. The short-comings of the clarionet, oboe, and bassoon, are of another kind, relating rather to quality than to pitch. Performance on every instrument requires or is facilitated by some special physical gift of hand or lip. It is difficult enough for some persons, under the most favourable circumstances, to become good performers on the violin or pianoforte; but success on some wind instruments seems to be attainable by only a few. The trumpet proper has all but disappeared from the modern orchestra, solely on account of the difficulty of blowing it. The instruments on which trumpet parts are now commonly played are not trumpets proper, but composite, hybrid instruments, much easier to blow, and immeasurably inferior in quality. A lip strong and sensitive enough successfully to cope with the difficulties of this instrument seems to be as rare as the conformation which results in a fine tenor voice. This seemed the place, Mr. Hullah said, to speak of the qualities needed to make a thoroughly good orchestral performer—an expression which must be understood to represent a good executant, and a good deal besides. The fable of the bundle of sticks has no application to an orchestra, which is good, bad, or indifferent, in proportion to the number it contains of good, bad, or indifferent players. On some players rests a smaller weight of responsibility than on others, but all are called upon for the exercise of excessive vigilance. The stringed-instrument parts in an orchestra are severally performed by many players. Occasional relaxations of attention on the part of individuals among them may, therefore, do little harm, and escape notice. At the same time, no player in an orchestra, however large, can make a decided mistake without its being heard, and without half his collaborateurs knowing who makes it. But the wind instrument parts are all individual; no two performers play the same part. The second performer in each case, often playing from the same book as the first, may sometimes rely upon the latter; but the first performer on each pair of instruments is entirely dependent on his own presence of mind and power of attention. In the course of an oratorio or opera of average length, there are often some hundreds of changes of time or key, or both, and within the limits of each of these innumerable pauses, ralentandos, accelerandos, and sustained notes, the duration of which were subject to the will of singers, not at all bound to execute the same passage twice alike. Sometimes a particular instrument is silent during a movement, or two or three successive movements. Throughout these, unless the player knows the work well, he must count his bars of silence, that he may be prepared for re-entry, often, at some critical point, the missing of which, by an instant of time, would turn the harmony to which he should contribute to hopeless discord, and bring a thousand

execrations on his devoted head. With one eye on his music, the other on the conductor's baton, and his ears everywhere, the attention of the orchestral performer is often exercised without a moment's intermission during a performance lasting for three or four hours. A history of the orchestra would no doubt make an interesting book, certainly a large one, could the material for it be got together, which it is not likely that it ever will. Stories have come down to us, which have evidently lost nothing in the telling, of vast gatherings of vocal and instrumental performers in very distant times; but how these were composed, what proportions the instruments bore in numbers one to another, how the performers were made to work together, what sort of music they performed, all these are questions which will doubtless often be asked, with little chance of their ever being answered satisfactorily. It is pretty certain that a Greek orchestra was limited to the production of melody in unison or in the octave, accompanied by an occasional fourth or fifth above or below it, and, in passages of great intensity, by drums, cymbals, and other one-noted instrument of percussion. But the history of other arts does not justify our assuming that the music of every people, cotemporary with or anterior to the Greeks, was of the same nature as theirs. Mr. Hullah had touched on this point before, but it was so important that he would venture to repeat what he had already said. The Greeks took their arts, in the first instance, from peoples older in civilisation than themselves. They of course rejected what they found distasteful and antipathetic. Their tastes and sympathies went all in the direction of the simple and the clear; and their all but exclusive use of melody no more proves that harmony was unknown to the Assyrians, the Hebrews, or the Egyptians, than does the exclusive use of the lintel in Greek architecture prove that the arch was unknown to their predecessors or contemporaries. We know not much more about the orchestras of the middle ages than about the orchestras of a higher antiquity. We have ascertained, from sculpture and painting chiefly, what the mediæval instruments were to the eye, which enables us to form a very fair estimate of what they were to the ear. But how they were grouped, and what effect resulted from their grouping, are still matters for speculation. The 14th century seems to be the epoch at which musical gatherings systematically organised began to be numerous and important enough to deserve recording. One of the most remarkable was in the year 1341, when Petrarch was crowned in the Roman Capitol. At the ceremony were present two bands of musicians, the one vocal and the other instrumental, who continually sang and played "in sweet harmony" (*con dolce concento*). Boccaccio's party of ladies and gentlemen, to whose retreat from Florence during the plague in the same century we owe the Decameron, are described as continually singing and playing on different instruments. Those mentioned are the lute and the viol, on which latter several of the ladies performed, and the cembalo, probably some kind of spinet. But one of the earliest orchestras of which we have any satisfactory account, and of which the parts were expressly written for the instrument, was that employed in Peris' opera "Euridice," performed at Florence in 1600, at the marriage of Henri IV. of France and Marie de Medicis. The orchestra presents a striking contrast with those of Italian operas of the present day. It consisted of four instruments, a harpsicord, a large guitar, a viol da gamba, and a lute. Seven years later Monteverde produced his opera "Orfeo," in which he employed an orchestra of thirteen different instruments, some multiplied by two or more, so that the number of performers amounted to thirty-six. These were never all employed simultaneously, but only in groups of two or three,—on one occasion only of ten. Among the instruments are mentioned *due violini piccioli alla Francese*—possibly violins proper, but more probably kits. From this time, the beginning of the 17th century, the development of the orchestra continued, however slowly, with little intermission. In the second half of it orchestras of respectable size were formed, in France under Lulli, in Italy under Corelli, and in England under Purcell and his contemporaries. At the beginning of the last century orchestral composition and performance received a great impulse in Italy from the foundation of the School of Naples by Allessandro Scarlatti, and in Germany through the genius and industry of Bernhard Keiser, director of the opera at Hamburg. With the early days of Joseph Haydn (b. 1732) the history of pure instrumental music really begins, and from them it must be read chiefly in the lives and works of his countrymen. Among these the first place must be given to Mozart. Prodigious as the steps may be which subsequent masters—Beethoven for instance—have made in the development of the orchestra, one particular step of Mozart exceeds them in extent and in importance. In the opera "Idomeneo," produced at Munich in 1780, the modern orchestra was definitely formed, and in that work may be found, by those who know how to seek them, the principal canons by which orchestral composers have on the whole been guided for the last eighty-seven years. Great progress had been made in orchestral effects since 1780, by Mozart himself, no less than by his successors; but the progress had been in directions first taken by Mozart, and the chart of which is the score of "Idomeneo." Mr. Hullah then proceeded, aided by a diagram, to explain the compass and other peculiarities of the various instruments used in the modern orchestra, their proportions as to numbers one to another, with other particulars as to the modes in which they were used. The lecturer proceeded then to speak of those domestic substitutes for the orchestra —the pianoforte and its predecessors. The latter—the plucked keyed instruments—flourished from the 14th century down to the end of the last, in the early part of which the idea of bringing hammers to act upon strings by the key-board occurred to three ingenious artists— Marius, a Frenchman; Schröter, a German; and Cristofali, an Italian. To the latter belonged, beyond doubt, the honour, or the good luck, of having first made his invention known,—in the year 1711. Mr. Hullah then called attention to an instrument in the room, of a class of which the majority of his audience had probably met with few or no specimens. It was a harpischord (date 1623), made by the celebrated Rucker, of Antwerp, and perhaps one of the most perfect in existence. It had two rows of keys, which afforded the only variety in intensity of which it was capable. It was in consequence of this possible variety that its successor was distinguished as the piano-forte, *i.e.*, the soft or loud. In the harpsichord the string was plucked or pulled by a quill, and unless the key which acted on it was struck very decidedly it produced no sound, while a too hard blow produced no more, but would make a disagreeable rattling. Mr. Hullah then further explained the mechanism of the instrument, the quality of which would appear to those who had never heard it before somewhat thin and wiry; but, perhaps, after listening to it for a few moments they would find that, however inferior in some respects it might be to the pianoforte, it was not without a charm of its own. The lecturer then played a movement from a fantasia by C. P. Emanuel Bach, a gavotte by Padre Martini, and Handel's "Harmonious Blacksmith;" concluding, at the request of the chairman, with "God Save the Queen."

The Chairman (Mr Hawes), said that as this was the last lecture of a course which he believed had given especial pleasure to a numerous audience, he thought they would be glad that he should take this opportunity of thanking Mr. Hullah for the valuable information he had conveyed to them, in a most agreeable form. The art of music was one that now excited so general an interest, and was so widely cultivated, that he thought the favourable manner in which these lectures had been received would probably induce the Council to take up,

in future sessions, this and other subjects which were not only interesting to the members themselves, but also to the ladies, who, he was happy to see, formed an unusually large proportion of the audience during the course just concluded.

Twenty-first Ordinary Meeting.

Wednesday, May 8th, 1867; John MacGregor, Esq., in the Chair.

The following candidate was proposed for election as a member of the Society:—

Davidson, James, Laboratory Department, Royal Arsenal, Woolwich, S.E.

The following candidates were balloted for, and duly elected members of the Society:—

Ainslie, Montague, Grizedale, Hawkshead, Windermere.
Amhurst, W. Amhurst T., Didlington-hall, Brandon, Norfolk.
Essell, George, The Precincts, Rochester.
Fisher, Thomas, 24, Hanway-street, W.
Hutton, Thomas Winder, 5 and 6, Newgate-street, E.C.
Maddick, Alfred, 40, Clarges-street, Piccadilly, W.
Rylands, Peter, Bewsey-house, Warrington.
Sayer, Commander George, R.N., Statenborough-house, Sandwich.
Tinne, John A., F.R.G.S., Brierley, Aigburth, near Liverpool.
Toler, Hon. Ottway Fortisque, 6, Albemarle-street, W.
Weld-Blundell, T., Ince-Blundell-hall, Great Crosby, Liverpool.

The Paper read was—

RECENT INVENTIONS IN MILITARY BREECH-LOADING SMALL ARMS IN EUROPE AND AMERICA, PARTICULARLY IN THE UNITED KINGDOM AND THE UNITED STATES.

By Capt. O'Hea, late 25th Regt., K.O.B.

By the term "recent inventions," I mean to convey that, as far as it is possible for the explanation of such a subject, it is my intention to confine my remarks this evening chiefly to fire-arms invented within the past seven or eight years. It is a proverb that, "Beneath the sun there is nothing new," and this, in a particular manner, appears to apply to breech-loading fire-arms, as we find in the armories of the Tower of London and of Woolwich breech or chamber-loading and repeating guns bearing dates as far back as the middle of the sixteenth century; but I shall leave to the curious in such matters the enjoyment of a dive into rusty antiquity for complex and cumbrous inventions of past ages, and, with your permission, proceed to discuss the ingeniously-contrived, smoothly-working, and more deadly weapon of the present day.

To enable you to understand more easily the principal advantages and mechanism of the several breech-loading arms which I shall have the honour to bring to your notice this evening, it is necessary that I should preface my paper with some remarks on the cartridges suited to, and in use with, the arms. The metallic cartridge is the one to which, in particular, I wish to ask your attention; indeed, the invention of paramount value, appears to me to be this cartridge, for the arms can only be remarkable as very ingenious pieces of machinery for carrying out that invention.

A cartridge containing its own ignition is by no means a recent discovery, for, in 1831, Monsieur Robert invented or patented such a cartridge, and in 1836 a Parisian, named Lefaucheux, introduced the metallic cartridge at present, with various modifications, in general use, with smooth-bore sporting arms, and which answers well the purpose for which it is intended.

The cartridge for the Prussian needle-gun, which, although not metallic, contains its own ignition, has been in use in the Prussian service many years. But the metallic cartridge for weapons of war was first largely adopted by the Federal army during the late civil war in America, and was the parent of many beautiful inventions in breech-loading small-arms. There cannot, I think, be a doubt but that to the adoption of this cartridge and the weapons it called forth, may, in a good measure, be attributed the closing of the great civil war of modern times, and the terminating of vast sacrifices of human life and of treasure.

For the purpose of explaining the important connection of the cartridge with the breech-loader of the present day, I will select for description from the many kinds now in use, four—

1st. According to date of invention or patent, is the rim fire copper-cased cartridge in general use in the United States for the past seven years.

2nd. The Boxer cartridge, recently adopted in our own service for use with the Snider breech-loading rifle.

3rd. The Chassepot cartridge, adopted in the French service for use with the Chassepot gun.

4th. The cartridge recently invented by Mr. Daw, of Threadneedle-street.

The first-named (American) is a simple metallic cartridge, consisting of four parts, viz., the shell, the fulminate, the charge of gunpowder, and the bullet. The shell is formed of one description, and from one piece of soft metal (copper),—is without joining or welding of any kind, being punched, or plugged out from the solid metal by machinery, and is as nearly as possible of equal substance or thickness throughout for the purpose of equal expansion. The means of ignition is in the shell, round the rim at the base, and, when loaded with the charge of gunpowder, this shell is made to grip the projectile, so as to unite it with the gunpowder and fulminate in one compact body. The projectile is solid, and composed altogether of lead. In addition to the small number of its component parts, this cartridge has much to recommend it. It is impervious to moisture, and may even be used after immersion in water. It is gas-tight, for the shell, expanding with the combustion of the charge, combined with the resistance offered by the initial movement of the bullet, completely seals the breech, and thus effectually prevents gas escape breechwards. It has the additional advantage that the copper shell can be re-formed and re-loaded after the contents have been discharged. A very portable and simple machine for this purpose is in use in the United States. I see that an instrument for closing and re-priming cartridge cases was patented in England on the 17th April, 1867, by a Mr. Thomas Horsby.

The original shape of this (the American) cartridge case was cylindrical, with a projection at the base for the fulminate, and to help the extraction of the expanded shell, but some modifications have been brought into use with particular arms, the one most highly spoken of being that of General Roberts, of the United States regular army. The peculiarity of this cartridge is that the cylindrical portion of it, which is larger than the bore of the arm, extends into the barrel but a short distance, when the diameter of the chamber, as well as of the shell, lessens slightly until the latter joins the bullet. The inventor informed me that this greatly facilitates the extraction of the expanded shell, causes more even expansion, and enables the cartridge to contain a somewhat increased charge of gunpowder, which latter is a great recommendation to General Roberts's cartridge, as the defect in all American cartridges is the want of a sufficient charge. I have seldom seen in the United States a charge of powder containing more than 45 or 50 grains used in metallic cartridges for an arm of 45 or 50 calibre, to propel from 350 to 450 grains of lead, and with this charge the trajectory, or course of the bullet,

is high and the shooting uncertain at ranges exceeding 500 yards.

The Peabody, Cochran, and Hammond rifles are the only American breech-loaders I have seen using a metallic cartridge with a charge of 55 or 60 grains of powder. However, this fault in the American cartridge could easily be rectified. Another peculiarity of American arms using the metallic cartridge I would mention here. The diameter across the base of the projectile used is always greater than that of the bore of the rifle, measuring from land to land or the raised portion of the rifling. Polygonal rifles, such as the Whitworth, are not used in the United States, consequently the bullet is forced to take the grooving as it passes through the barrel. This has its advantages. It is impossible the bullet can strip, avoid taking, or leaving the grooves; and I have seldom heard of fractures.

The second description of cartridge, the Boxer, is known to you all. I will call it a compound metallic, for, though, like the first-named (American cartridge), it consists of but four parts, viz., the shell, the fulminate, the charge of gunpowder, and the projectile, two of those parts are compound in themselves. The shell, or cartridge-case, is of two distinct kinds of metal, brass and copper, and in three distinct parts, namely, the base, the coil shell, and the cap for fulminate, and the projectile is composed of lead, wood, and clay, wood for the centre of the bullet and clay for the expanding plug. The cylindrical portion of the cartridge-case is formed of a little over two turns of very thin sheet brass, which is supposed to be expanded, or rather slightly uncoiled, by the explosion, thereby avoiding the danger of fracture of metal by expansion, and of consequent gas escape, even though the cartridge be used in a chamber somewhat larger than its diameter. The base of the cartridge-case is also of brass, but of much greater substance than the cylindrical portion of it, to which it is welded or soldered, and it has a projection to stop its entering too far into the barrel, as well as to facilitate its extraction.

In the centre of this base-piece is fixed a cap of copper, which contains the means of igniting the charge, and from which the cartridge derives the title, central fire.

For the purpose of retaining in the new projectile (although decreased in weight by 50 grains), the length and figure of the old, as also with a view to place the greater weight as far as possible from the centre of rotation, the bullet has a picket of wood running through its centre, halfway from the apex of the cone towards the base. At the base is a cavity, containing an expanding plug of baked earth, which latter is also intended as a support to the sides after expansion.

As was a necessity with the old muzzle-loading arm, the bullet for the present breech-loader is still made smaller than the bore, and depends for expansion into the grooves on the plug of baked clay at the base. This is peculiar, and why retained I cannot say, unless the material of which the barrel is formed (soft iron) renders necessary the avoidance of forcing the bullet through the grooving, thereby causing extreme expansion. I am more disposed to conjecture this to be the cause of the size of the present bullet, from the caution inculcated regarding the care of the barrel, in the "Regulations for Conducting the Musketry Instructions of the Army," under the head "Cleaning Arms," Part IV., pp. 24 and 25. Although the cartridge-case covers the *cannelures* or grooves which contain the lubricant, it does not grip the bullet, merely holding it loosely in its place.

I am not aware that this cartridge-case can be reprimed and charged after being once used. The charge of powder is 75 grains, and the weight of 60 rounds is about 6 lbs.

It would be presumptuous in an humble individual like myself to offer any opinion of the merits and performance of the Boxer cartridge, when the report of so high an authority as the Inspector-General of Musketry is published on it. I shall therefore give you General Hay's report, than whom there is not in England one more competent to judge of the merits of a rifle or rifle projectile. The report was printed for the information of Parliament and the country on the 22nd February, 1867. It proceeds thus:—

Report of the Shooting of the Snider Breech-loading Long Rifle with the new or No. 3 pattern Cartridges, Bullet weighing 480 *Grains.*

Hythe, 15th February, 1867.

Sir,—In obedience to the instructions contained in your letter of the 29th ultimo, I have made a trial of the "central fire ball cartridges made up with a shorter, or 480 grains bullet, called pattern III.," with the Snider breech-loading long rifle, and have now the honour to report, for the information of His Royal Highness the Field-Marshal Commanding-in-Chief, that the shooting at 600 yards is equal to, and at 800 yards better than that of the muzzle-loading long Enfield rifle, pattern 1853, with ordinary ammunition, *vide* table as per margin. I would remark, however, that the angle of elevation with the Snider rifle is considerably greater at both distances than the Enfield rifle, pattern 1853, although the bullet is 50 grains lighter. I need hardly observe, that while the curve of the trajectory is considerably increased (a serious defect in a military arm) the penetration, owing to the decrease of momentum of bullets, must be considerably less than with the ordinary muzzle-loading ammunition. In several instances the cartridge case stuck fast, and could not be removed without the ramrod. The rifle fouled considerably, and in one or two instances there was a slight escape of gas, which did not however interfere with the working of the breech-block. I have no doubt that these defects will be easily overcome when the process of manufacture is better understood. The weather has been very unsettled, hence the delay in making the trial in question, and this report consequent thereon.—I have, &c., C. Hay, Inspector-General of Musketry.

With reference to the latter part of this report, I think it right to state that the defects in the cartridge to which the Inspector-General alludes have, I trust, been overcome in process of manufacture, as I have been lately informed, by the well known gun-maker, Mr. Field, of Holborn, that the Snider breech-loading rifle, in the trial of small arms which is at present being carried on by a special commission at Woolwich, is as yet holding an advanced position, being second or third in the competition. Mr. Field has also kindly given me several cartridge cases of this description, which have been used with the Snider breech-loader, and which, as may be seen, exhibit no trace of gas escape.

The cartridge I have named third, the Chassepot, in use with the Chassepot gun, I will designate a semi-metallic cartridge, as the face of the powder case only is protected by metal. It consists of six parts, viz., the priming, the powder case, the powder, the paste board wad, the ball case, and the ball. The priming consists of a copper cap, like the ordinary military percussion cap, but of smaller dimensions. It is formed at the bottom with two holes diametrically opposite each other, intended to give free passage to the charge of powder for the spark or flash, the fulminating powder being placed at the bottom of this cap; a small plug of cloth or wax covers it, so as to protect it from external concussion. The cap is then covered with a thin washer of brass, copper, or other metal, which is pasted upon or attached to paper, for forming the base of the cartridge, and the priming is thus complete. The powder case is formed from a rectangular piece of paper, rolled upon a mandril, and pasted at the edges. When the case is dry, the priming is inserted by a mandril, and the end of the case is then closed and pasted. The case being thus prepared, the charge of powder is inserted, and is pushed down gently to give rigidity to the car-

tridge.* A pasteboard wad is next placed on the powder, formed with a hole, into which the twisted end of the paper of the case is inserted, the excess paper being cut off. I have adopted the words of the specification.

The ball case is composed of a paper jacket having two folds of paper, pasted and closed at one end only. The ball is of an elongated tapered form, with a flange at the base. After placing the ball in its case this case is connected to the powder case by a string or thread passed round a groove on each case, a slight distance behind the wad. Finally, the cartridge is greased. The price of the cartridge is 60s. per thousand; the price of the rifle is only 70 francs.

4th. According to date of patent, I have chosen the cartridge lately invented by Mr. Daw, of Threadneedle-street, which I shall also call a compound cartridge, and which amongst recent inventions is worthy of special mention, as containing some peculiarities of novel and ingenious description. The cartridge, like the other metallic cartridges I have specified, is composed of four parts, two of which are compound. The bullet, as in the Boxer, has the wooden picket through half its longer axis, and the clay plug in the base for expansion. The shell is also of brass, and in three parts, retaining the copper cap for the fulminate in the centre of the base.

In almost all other respects this cartridge differs materially from the others I have mentioned. It is much shorter than the present service cartridge, and the inventor consequently claims for it great facility of extraction from the regulation arm. The cylindrical portion of the case is composed of a little over one fold of thin metal, which being united is perfectly gas-tight, and, from the slightness of this one fold, of little or no weight, and of great flexibility and toughness. The latter is a marked advantage over stouter metal, as the case, on the ignition of the charge, cannot fail to take the form of the breech or chamber in which it is enclosed, and cannot impede in the least the extraction of the shell after explosion, as the sudden alteration of temperature after the gas leaves the barrel causes a slight contraction of the metallic shell. Mr. Daw informs me that when the breech-block is open, without using the extractor, the cartridge-case can be removed by a puff down the barrel from the muzzle. It is water-proof as well as gas-tight, requiring no paper covering or lubrication, as, in addition to the shell being joined by cement or solder, it grips the bullet closely above the *cannelures* or grooves, and thus the projectile, with the powder and fulminate, are held together in one compact body by the slight shell. The weight of sixty rounds of this cartridge is 5 lbs. 11 oz., the weight of bullet 465 grains, that of shell and fulminate 105 grains, and the charge of gunpowder is 65 grains. I am informed by Mr. Daw, the patentee, that the cost of this ammunition is £4 5s. per thousand.

Besides those I have selected for explanation, there are various other descriptions of metallic and semi-metallic cartridges, each possessing some peculiarity to recommend it. Amongst the American inventions are the Spencer, Peabody, Ball and Lamson's, the Henry, the Cochran, and a multiplicity of others, for our relatives at the other side of the Atlantic appear of late years to have turned their inventive genius in this direction; but, as I have already stated, the propellent force is deficient in all, save a few, for accuracy at ranges beyond 500 yards; the Americans being under the belief, and with good reason, derived from sad experience and actual practice in the field, that rapid fire at short range, when there is little chance of missing the object fired at by troops but partially trained to steadiness in the ranks, is the essential for military, or rather militia and volunteers employed against an enemy.

Of English cartridges there are not such a variety. The same necessity for such inventions, we are thankful to say, has not existed for calling on English inventive talent. There is one, however, recently invented cartridge, or rather cartridge-case (for I regret to say I have not been able to inspect the projectile used with it, or the charged cartridge), which deserves particular mention, not only as a clever contrivance to suit a particular arm, but as a departure from the fashion and manufacture of cartridge-cases in brass, folded or punched metallic substance. The inventor is Captain Selwyn, R.N.

You will easily perceive, then, the important part the metallic cartridge has to perform with the breech-loading arm of the present day, acting as it does as an expansive metallic chamber, containing the charge inside the bore, and only requiring a support of sufficient strength to keep it from moving, to ensure its being a perfect check to gas escape breech-wards.

Before closing this part of my paper there are a few suggestions which I would venture to offer on the system of metallic cartridges in general, acquired from some little practical experience.

In the metallic cartridge there appear to me, in addition to the great essential of a sufficient charge of gunpowder for the diameter and length of bore and weight of projectile, five other requisites for ensuring a favourable result or return in the use of the metallic cartridge.

1. That the shell or case be of metal, of such description or substance as will ensure its expanding or contracting, but not fracturing.

2. That the shell be formed of one piece if of soft metal, and of one fold if of harder or medium metal, and that it be gas-tight, limited as to power of, and space for expansion.

3. That the expansion of different metals being unequal, the insertion in any part of the shell of any foreign piece of metal, or even of a distinct piece of metal of the same kind, be avoided, as tending to weaken or fracture it and increase the cost of manufacture; the fulminate ought also to be placed somewhere on the inner surface at the base of the shell, no matter how that surface may be modelled.

4. That the shell grip the bullet so that the cartridge may be impervious to moisture, and that the expansion of the shell may be compulsory or inevitable on the expulsion of the bullet.

5. That the base of the projectile be of such a diameter that it is not only forced to take the grooves as it enters the rifled portion of the barrel, but that all chance of gas escape round the bullet is impossible, and that the latter contain no foreign substance or body that would make it liable to fracture on being driven into the bore, or make the manufacture of it complicated or difficult under any circumstances.

The advantages of central fire over rim ignition which, in theory, are no doubt maintainable, are not found so in practice, at all events at medium or short ranges, to be appreciated, at least at a range where military fire in line would be effective. When it it is considered that central fire cartridges, having conical or pointed projectiles, cannot be used with the magazine arms at present known or in use, without positive danger to the person using the arm, and to all standing near him, I am sure you will agree with me in thinking that any theoretical or other advantage the former may possess does not give it equality with the rim-fire metallic cartridge.

I now turn to remark upon the arms suited to the use of the metallic cartridges, which I have endeavoured, however imperfectly, to place before you. My object is not to speak of the barrel of the rifle, but I may mention incidentally one or two points, which may not be generally known to ordinary observers, first reminding you that the chief properties of a good fire arm are power, accuracy, and rapidity of loading.

The accuracy of an arm mainly depends on the finish of the bore, and the weight and quality of the metal of the barrel. The greatest accuracy is attained at short and medium ranges, and when the influence of

* This is peculiar, and in the English school would be considered equivalent to loss of range.

the wind and of the atmosphere are but slightly felt, by rifles having equal expansion throughout the barrel—the most perfect barrels being manufactured of metal of equal quality, and having a thickness of such metal all through from breech to muzzle equal to the diameter of the bore. As all reductions of this weight, or lightening of the metal towards the muzzle, unless compensated for by a continued and gradual alteration of the quality of the metal throughout the barrel (which I conceive to be an impossibility), must be at the expense of accuracy, no such certain results can even be attained from a barrel sufficiently light at the muzzle for use with troops.

Upon the quality, and the quantity, to a certain extent, of powder used, depends power. I will, therefore, assume for the present that all small arms are equal in force and accuracy, as they may be made if they are not, and will turn to explain the mechanism of the frame, and the appliances for loading and closing the breech of several fire-arms suited to the use of the metallic cartridges in the foregoing varieties.

To the observant soldier or civilian, acquainted with the use of fire arms and interested in military or other arming, it has long been evident that, not only does the question of efficiency and military success depend upon the end of the barrel which receives the charge, but also upon the use of that arm which can be loaded with the least difficulty and in the shortest space of time.

Assuming, then, that time spent in changing fire arms is time lost, it follows that if we could be so fortunate as to get hold of an arm of simple and durable construction that would require no time to load—in fact, which after each discharge would be found ready loaded for another, leaving all time to aim and fire, we should have a perfect, in fact a magic weapon. Such an arm not being forthcoming in the present day the next best would be the one requiring the least time to load, of course everything else being equal, simplicity of construction, durability, finish, and all other essentials.

That arm which requires the fewest and simplest movements to load it, can be charged in the shortest space of time, but, as we are all instructed, and know well, that aim, to be effective, cannot be limited as to time, leaving the sharp-eyed or quick-fingered volunteer, or the more slow and well-trained regular to fire in his own good time with a snap shot or rising aim, I shall now endeavour to place before you several descriptions of breech-loading small arms, which, for convenience in explanation, I propose to divide into three classes:—

1. Single-loading arms, or breech-loaders simple.
2. Repeating breech-loaders, or magazine arms.
3. Single-loading and repeating arms combined, or compound breech-loaders.

By the first division I mean breech-loaders in which the barrel is charged by hand from the ammunition or expense pouch of the soldier round by round of ammunition. By the second I mean arms containing a magazine from which ammunition, to a certain extent, is supplied to the barrel round by round by mechanical means, and which when exhausted is replenished by the soldier's supply in his pouch. The third division is a combination of the first and second, being a single-loading arm having a magazine in reserve.

Of the first division—single-loading arms or breech-loaders simple—I have some here of English and American manufacture, as also the French arm, the *Chassepot*.

It would be difficult to make a selection from so much that is excellent, were it not necessary that I should follow to some extent the classification I have adopted in the explanation of the cartridges. I will therefore first attract your attention to those single-loading arms suited to the use of the four descriptions of cartridges I have chosen, and afterwards shall be happy to give any explanation in my power regarding others which have been entrusted to me.

The Peabody rifle will worthily represent a single-loading arm, using the copper-cased rim-igniting cartridge. It is Yankee in the fullest sense, being a Massachussetts invention, and bearing a name justly honoured in this great city. It is a very simple arm, as you will see, and I understand most effective. Exclusive of the frame, the breech-loading appliances consist of four parts and five pivots. The means of extracting the charged cartridge, or empty shell after explosion, is the simplest and most perfect I have ever seen. It is effected by the action of an elbow lever, which throws it out with unerring certainty the instant the trigger-guard is lowered; and this lever derives its power from the action of the breech-block itself, and cannot become deranged, as it is not dependent upon any springs, and is of such strength as to prevent the possibility of breakage or derangement by any service to which it can be exposed. The rifle cannot be discharged until the breech-block is in its proper position, and when not loaded it cannot be injured in the least by being snapped. It has been reported on by the board of officers appointed by the United States War Department for inspecting small-arms, as being "undeniably the best for the use of troops," their duty being only with reference to an arm for military purposes.

This arm can be loaded in two simple movements, the extractor doing the duty of another motion, as follows:—

1. With the thumb of the right hand close down the guard lever with some force, and the cartridge or shell in the barrel will be immediately thrown out. Carry the hand to the pouch, and take hold of a cartridge with the forefinger and thumb.

2. Place the cartridge into the barrel, pushing it home with the thumb. Close the breech, and the gun is ready to fire, on being cocked.

You are no doubt aware that for this description of cartridge rim-fire the exploding bar, or striker, must be somewhat at one side, not in the centre of the breech-block. The weight of the Peabody long rifle is something less than our regulation arm, its calibre ·50. The charge of powder is sixty grains, and the weight of ball is 425 gains.

I have here other varieties of single loading arms adapted to the use of the rim-fire copper cartridge, all of which are American inventions, such as the Cochran, the Jocelyn, and the Hammond.

The Hammond breech-loading rifle, which I received for inspection a few days since, is a novel description of American single loader, and relates to that class of fire-arm in which a solid swinging breech-block is used to open and close the cartridge chamber, and, at the same time, to act on the ejector.

The invention consists, firstly, in making that part of the frame against which this rear portion works of an eccentric form, so that when the breech-block is swung to the left, it will have a lateral and oblique rearward movement, for the purpose of opening the cartridge chamber, and when swung to the right shall have a lateral oblique forward motion to close the cartridge chamber.

The inventor claims for this arm that it has no weak parts, is not liable to get out of order, and may with safety be placed in the hands of raw recruits.

In the limited space of my paper it would be impossible to give a full and detailed description of this or any of the arms I have here, but in this particular one there are a few peculiarities of merit to which I think I ought to attract your attention, viz., that the hammer is made to serve, at the time of firing, to lock or key firmly together the frame and breech-block; also, that it is impossible for it to be snapped until the breech-block is in its place. I have only seen one other American rifle in which a somewhat similar appliance has been adopted, namely, Weasons' patent. I am informed that Mr. Daw has fired this arm, at a trial at Chislehurst, with deliberate aim, ten times in fifty-seven seconds, making at a hundred yards three bulls'-eyes and hitting every round. The weight of the American rim fire cartridge for the Hammond arm is 527 grains. Copper case, not quite 90 grains; ball, 378 grains; powder, 59 grains. Mr. Daw

has converted this rifle into a central fire arm to suit his cartridge, altering the charge of powder to 56 grains.

The representative of the inventor of the Hammond rifle is present this evening, and he or Mr. Daw will give more particular information on the arm, should it be required, during or at the close of the discussion.

The arm for which the second description of cartridge was invented, is the Enfield rifle converted to a breech-loader on the Snider system. Regarding the practice with this arm, I refer to the official report of the Inspector-General of Musketry, already given. To load the Snider two movements are necessary, one of which is compound, having several motions under the head of one order, namely that part of the movement detailed at "Three" of the order "Present," and commencing—"Half cock—open the breech—and, holding the breech-block firmly with the forefinger and thumb, by means of the thumb-piece and nipple-lump, draw it back as far as possible by a jerk, raising the muzzle of the rifle slightly in doing so, to remove the empty cartridge-case; at the same time cant the rifle sharply over to the right, to allow the case to fall out, bringing it again to the horizontal position; then, carry the right hand to the pouch, and take hold of a cartridge at the rim with the forefinger and thumb" *(vide* "Platoon Exercise" for long and short Snider breech-loading rifle). Though this arm may not be as perfect in all respects as some original inventions, it ought to be remembered that it is a convert, and, taking everything into consideration, it is a good arm, and much has been made of the old material. I have seen a few other arms altered to suit the central fire cartridge. I may mention one, the Mayall, which, by the kindness of Mr. Crane, gun-maker, I have been enabled to examine, and which appears a capital conversion.

Of the Chassepot gun, using the Chassepot cartridge, I can say but little from my own experience; it is a needle gun, and the invention consists mainly in the contrivance adopted for preventing the escape of gas breechwards. The hermetic closing of the breech parts is obtained by the instantaneous compression, under the action of the explosion, of a vulcanised caoutchouc washer interposed between the front face of the breech-bolt and a flange, or shoulder, upon the needle-guide, which guide is marble. The washer and the flange, or shoulder, are of a little less diameter than the breech in which they are fitted, so as to facilitate their play therein, but the diameter of the front face of the breech bolt is as nearly as possible equal to the inner diameter of the breech. When the explosion takes place, the pressure transmitted by the movable needle-guide to the washer is such that the latter is compressed sufficiently to hermetically close the rear end of the barrel, and thereby prevent all gas escape. (Those who have noticed Thompson's patent stoppers, used by Messrs. Crosse and Blackwell for their pickle bottles or jars, will at once understand how this is effected.) After the charge is fired and the pressure removed, the washer, by virtue of its elasticity, returns to its natural position. The washer is composed of three layers, one over the other, intimately united, and having different degrees of hardness, viz., the two outward layers are of much harder substance than the centre one, so that, on being pressed, the intermediate layer, which is perfectly elastic, expands. The mechanism of the breech consists of seven parts. Any central-fire breech-loader can use Mr. Daw's cartridge.

Of the second class of arms, repeaters, I have here two good specimens, of the performance of which, in actual practice against an enemy, I can speak from some experience, having been in the United States during the latter part of the civil war. The Spencer is a repeater of seven rounds, having the magazine in the stock, between the heel-plate and the breech, which magazine is composed of a double sheathing of metal strongly incased in the wood, and thus presents as formidable an obstacle against external force as does the barrel itself. It is asserted that the cartridges in the magazine of the Spencer are, if possible, less liable to premature explosion than is a single cartridge of the ordinary kind in the barrel of a muzzle loading arm. There are, however, with all its merits, like everything in this world, two or three weaknesses in the Spencer which I should wish to point out. The magazine spring being a detached, part is liable to be lost when loading the magazine, the extractor, which levers out the shell of the cartridge, may be bent or broken, and the cartridge in travelling from the magazine to the chamber sometimes jams; but I am informed that two of these three little blemishes are about to be corrected in this most efficient arm. The barrel of the Spencer can be charged from the magazine by the lowering and rising of the guard-lever, another motion being required to cock. The weight of this arm is 10 lbs., the charge of powder is forty-five grains, and the weight of the ball 400 grains.

The other arm of this class which I have here, the American Henry, has a magazine of fifteen rounds, which is situated beneath the barrel and parallel with the bore. The magazine can be filled in thirty seconds, and it is asserted that the gun can be fired from the shoulder fifteen times in ten seconds. The charge of powder is 25 grains, and the weight of ball is 216 grains. The great objection in this arm, namely, the magazine being exposed and the necessity of loading it from that end next the muzzle, has been removed in the improved arm, the Winchester Henry. By lowering and raising the guard lever the barrel of this arm is charged with a cartridge, the cock at the same time being placed at full bent, by which one motion is saved.

Of the third division, compound breech-loaders, there are two here for examination—Ball and Lamson's repeating and single-loading carbine, and the Spencer already named, converted into a compound breech-loader. At the commencement of this paper, I quoted the proverb, with reference to fire-arms, that "there was nothing new beneath the sun," but the first-named arm is the exception to prove the rule, for I have never read or heard of an invention with such power. It combines all the advantages of a single-loading gun and a repeater, being used for either with equal facility. It may be fired as a repeater nine times in eleven seconds, and as a single-loader twenty-five times per minute, so the inventor asserts, and Mr. Lamson has informed me personally of the same. The magazine full of cartridges may be held in reserve for any sudden emergency while using the arm as a single-loader. It may also be emptied of cartridges without firing or detaching any of the parts. If one or more cartridges should be put in the magazine wrong end first, on working the lever every wrong cartridge will be thrown out by the ejector, without interfering with the working of the gun, or causing the removal of any part of it. There can be no explosion of the magazine, as this is securely closed whenever a cartridge enters the barrel; it is entirely covered and protected from accidents. The weight of the carbine is only $7\frac{1}{2}$ lbs., the calibre is ·50, the length of the barrel is 22 inches, the charge of powder 45 grains, and the weight of bullet 350 grains.

This little arm is an American monitor on a small scale, for it admonishes you when it is loaded, as you cannot open the breech when there is a cartridge in the barrel without going through the motions of firing, that is, drawing the cock to full bent, and letting it down again on its bearings, the breech being locked whilst the arm is at half or full cock. It has one other peculiarity I would mention, there is no danger of the fixing from rust nor other causes of either pin or striker, as neither one or the other is required, the charge being ignited by a blow on the cartridge case direct from the hammer.

I have often heard repeating arms objected to, on the score that the supply in the magazine would be wasted by the soldier. When looking back at the register of the practice, to use a musketry term, on human targets,

of troops but partially disciplined that were armed with this description of weapon, during the late civil war in America, we cannot help looking on this objection as premature. Experience proves that, in the only war where these arms have been tested, the great superiority and advantage the soldier had over the enemy arose from the fact that his having such a weapon in his hand gave him confidence and self-possession, so that the chance of waste of ammunition through excitement was actually diminished.

I will conclude by thanking this assembly for having so patiently listened to my somewhat lengthy paper this evening, which, as can be perceived, has been hastily written; and I trust they will deal lightly, both in thought and word, with its many defects, and any peculiarity of opinion which I may have ventured to intimate.

DISCUSSION.

Mr. Nursey introduced to the notice of the meeting a specimen of the improved Spencer rifle, to which allusion had been made in the paper, and explained its mechanism. He said that the ordinary Spencer arm could only be used as a magazine rifle. He should not, perhaps, say solely as a magazine gun, beeause it had been used in America as a single breech-loader, by the magazine being shut off by a piece of string tied tightly to the guard lever, which prevented the magazine being opened; but there was this fault in the original arm, that if the extractor was not very nicely regulated, the cartridge shell jammed, and could not be easily extracted. Mr. Nursey stated that the main peculiarity in the arm was this: the action of the stop consisted in crossing the jaws of the double cartridge guide, which then stopped the breech-block from descending beyond a certain point by coming up against the extractor. Some trials had lately taken place with this rifle in France. In an official trial which took place recently, the firing commenced at 200 metres, and was carried on successively at 400, 600, 700, and finally at 750 metres. Bull's-eyes were repeatedly made by officers who had never fired the gun before. After the practice at 750 metres, the party moved up to 200 metres for the purpose of testing the gun at rapid firing. At this point forty-two shots were fired in two minutes, when the firing was momentarily interrupted owing to the barrel becoming too hot to be held with the naked hand. A thick glove was put on, and thirty more shots were fired at the same rate. As a single-fire gun many shots were fired with great rapidity.

Capt. Selwyn, R.N., said that it was generally allowed that in proportion as perfection in destructive agencies was arrived at, war would become impossible, and it was with that view they studied the question of the best mode of sending projectiles through the air which would destroy life to the greatest extent; although that must be looked upon as a rosewater mode of warfare compared with what had been proposed to be effected by chemical means, as described in a paragraph recently published in the *Standard* and other papers. We were, however, slowly and painfully elaborating the means of firing the greatest number of effective shots against an enemy in the shortest time; but it would be impossible to judge correctly of the merits of the different weapons submitted to them, unless they first of all considered the question—what was a sufficient projectile? The weight of bullet which had been decided to be effective was that which was capable of breaking a horse's leg at 500 yards, and this was found to be 520 grains. Such a bullet ought to be projected to a range 1,000 yards without too high a trajectory. It was well known that a low trajectory was of enormous value in a military weapon. If they took a charge of 50 grains of powder and fired a 520-grain bullet at 1,000 yards, they would have to point the gun almost to the sky. If, on the other hand, the weight of the bullet was diminished, it would not break a horse's leg at 500 yards; therefore they must adhere to the heavy bullet, and this involved a great amount of propulsive force. The propulsive force generally used with this weight of ball was 70 grains of powder, which was considered sufficient to give satisfactory effects at 1,000 yards. The first attempts with the French rifle were made with 386 grain bullets and 55 grains charge of powder, and the results were, as reported, that "the trajectory was anywhere, and the range nowhere;" thereupon the charge had necessarily been increased, and the weight which the soldier had to carry was something like 6 lbs. for 60 cartridges, or 10 to the pound. Out of that the bullet was 520 or 530 grains, and the powder charge 70 grains; and by no device could they materially reduce the weight of the cartridge if they adhered to the weight of ball he had referred to. If they diminished the weight of the cartridge-box or powder they could only do so to the extent of four or five grains, but if they took only a small piece of the lead there was a sensible reduction in the weight; but they could not do this consistently with efficiency. With regard to any magazine gun, it was only fair, in estimating the rapidity of firing, that the time occupied in filling the magazine should be taken into account; and, moreover, if the gun would not bear the full powder charge, it could only be regarded as a cavalry arm. If there was such a combination of springs and levers that the ordinary soldier could not manage the weapon, it became objectionable on that ground. He urged the meeting not to be run away with by a pretty toy, produced at the expense of simplicity. Neither the storm sands of the East, nor the salt water of the ocean, spared the most ingeniously-contrived springs and levers. Simplicity was the main point. He did not desire to speak of any particular invention, but only on the ground of principles involved in the question; and one most important point was with regard to the construction of the cartridge. They knew very well that at two miles distance an ammunition waggon afforded a target sufficiently large for any rifled field gun to fire a shot into it with certainty, and under these circumstances, if the ammunition was of a character which could be blown up, the resources of an army would disappear from the field before they could be called forth. That it was which led the American Government to decide that they must have metallic cartridges. As to what had been done in the way of metallic cartridges in this country, the Boxer cartridge was described in the paper as consisting of four parts only: he could tell them it consisted of no fewer than fourteen different parts, and of those fourteen parts only about six were absolutely necessary. Now, what did those parts consist of? They were a fold of sheet brass and a base of sheet brass. The original invention consisted principally of these, but, when that sheet brass was tried, it was found that there was expansion at the base, sometimes owing to the thinness of the metal, and sometimes extraction was impossible, therefore a solid piece of brass was added, 74 grains being the total weight of the cartridge. It had, therefore, been necessary to reduce the weight of the bullet at the expense of the utility of the weapon, and the secret of the conflicting reports made to the House of Commons on the efficiency of this cartridge was that in no instance had the same kind of cartridge been used—the powder and bullet charge were constantly varied. Captain O'Hea's very able paper had been one of the first to give them really the different weights of powder charge and bullet fired in the various rifles, and that was the whole measure of the efficiency of a weapon. If it could not carry more than 55 grains of powder it would not do for long ranges; if it would not carry at a low trajectory it would not do for infantry; and if the weight of ammunition was such that a man could not carry it, they might as well not have the means of firing with rapidity. A French gun had been produced to fire a great number of shots, but what was the use of it? Two men could carry the gun but they could not carry

the ammunition. Returning to the question of magazine arms, he recognized the value of the fact that they could be made so as to act both as single loading and magazine arms, but he would ask whether they had been produced of full size for infantry, fit to carry a bayonet? [Captain O'Hea said this was so.] Then the additional weight to be carried was the charges in the magazine, and they must take that into consideration. He had been much gratified by the interesting collection of breech-loading arms which had been brought before them that evening. He had seen larger collections, but none more judiciously chosen, and it required a man who knew his business well to select from a large number the few which were worth something.

Mr. Christy expressed his regret that he had not been able to bring with him a Chassepot rifle, owing to the manufacture of that arm being conducted in separate parts at different places. He believed there were only one or two of these rifles in this country at the present time.

Mr. Rigby (of Dublin), responding to the Chairman's invitation, said, being partly concerned in the invention of the cartridge known as the Boxer cartridge, this was naturally a subject in which he took a considerable interest. There were a great many ingenious contrivances in the American arms that had been brought before them this evening; but, however much our cousins across the water had been before us with their inventions in point of time, he thought the present year was likely to reverse the relative positions of the two countries in that respect; and the competition which our Government had so wisely set on foot would, he was sure, produce a great number of weapons of nearly, if not quite, equal value. We were very apt in this country to bow down to American ingenuity, and to sneer at the talents of our native artizans. He had seen, since his arrival in London a few days ago, several models of arms, some of which had been laid before the Government, which appeared to him the perfection of simplicity, and in that respect were not inferior to any American invention whatever. If he might be allowed he would ask the permission of the Chairman to call upon the inventor to bring before the meeting a weapon which had not been alluded to in the paper, and which was remarkable for simplicity.

Mr. Dines exhibited the rifle alluded to, and explained its parts and action. In this weapon the breech end of the barrel has connected to it a tubular body, forming a continuation of the barrel, the rear end of which is prolonged, in the form of a tang or strap, to receive the breech-pin, which is screwed through the stock from the trigger-guard below. The upper part of the forward end of the tubular body is cut away to admit of a cartridge being inserted into the barrel through the opening so formed. Sliding to and fro within the body is a tubular breech-plug, closed at one end. When the arm is loaded ready for firing, the forward end of the breech-plug closes the end of the barrel. To the rear end of the breech-plug a lever is pin-jointed, the pin being left projecting about the eighth part of an inch beyond the side of the breech-plug, so as to form a stop to prevent the breech-plug being pushed too far forward when the gun is empty. The lever at this time lies in the tang of the body, and the spur, at the end of the lever, passes through the tang, and is held in its position by a catch. Within the tubular breech-plug is a plunger, sliding to and fro. Behind the plunger is a spiral spring, which presses constantly against it. The rear end of this spring bears against the fore part of the lever, so that the plunger is pressed constantly against the forward end of the breech-plug. In front of the plunger is a small projecting piece, which passes through a hole in the forward end of the breech-plug, and acts as a striker to explode a cap in the centre of the base of the cartridge. When the breech piece is drawn back, a tooth on the stem of the plunger is moved back beyond a catch, which retains it. This catch passes through a hole of its own size in the underside of the body, and likewise through a slot in the underside of the breech-plug. It is retained in its position by the spring, which presses it upwards against the body. This catch is connected to the trigger, so that the breech having been closed, the catch may be withdrawn by pulling the trigger, and the plunger thus set free to be driven forward by the spiral string to explode the cartridge. In order to withdraw the empty cartridge case after the piece has been fired, the forward end of the breech-plug carries on its opposite sides two extractors, which, when the breech is closed, pass beyond the flange on the base of the cartridge case, so that when the breech-plug is drawn back, the empty case will be drawn back with it. If it is desired to render the arm useless at any time, or to clean the barrel from end to end, it may be done by pulling the trigger well back so as to free the block from the slot in the breech-plug, when the breech-plug may be entirely withdrawn from the rifle. Mr. Dines stated that he had fired 18 rounds in 70 seconds, making six centres and four bull's-eyes at 300 yards, the first time he used it. He had no doubt he should be able to fire 20 rounds in the same time. An important feature in this weapon was that the breech-plug could be readily taken out and carried away, leaving only the barrel and stock behind; so that in case of retreat the weapon could not be used against those by whom it had been abandoned.

Mr. Daw said he first introduced the present central fire system in this country in the year 1861, and took out a patent for it. Since then he had shown its merits in various parts of the world as applied to sporting rifles. Finding that the Government were set upon having metallic cartridges, he had given his attention to that matter for some months past, and he had introduced the cartridge referred to by Captain O'Hea in his paper. This cartridge was 67 grains lighter than the present cartridge known as the Boxer. It was made of the thinnest metal it was possible to get rolled compatible with being water-proof and gas-tight. It was composed of only four parts as compared with the number used in the Woolwich cartridge, and 60 rounds weighed 5lbs. 1oz. as compared with the weight of 6lbs. 8oz. for the same number of the Woolwich cartridges. With regard to what had fallen from Mr. Rigby, he would state that he had models of cartridge-cases made, under the suggestions of that gentleman, with a coil of brass such as was now used at Woolwich. He expressed his readiness to submit his invention to any public test that might be desired, and his conviction that his plan of manufacture would be a saving to the country of many hundred thousand pounds annually.

Mr. Botly, having expressed his admiration of the beautiful inventions and workmanship that had been laid before the meeting, inquired whether, at the rate of firing stated to be accomplished in some instances, the heating of the barrel was not so great that it could not be held in the hand.

Capt. O'Hea replied, after a certain number of rounds the heat of the barrel would become very great, no doubt; that would be after 35 or 40 rounds, according to the thickness of the barrel and the quantity of the metal. From the Henry rifle 30 rounds only could be fired without heating to an extent that it could not be held in the hand; but that had now been entirely remedied by constructing the weapon in such a way that there was no connection between the stock and the parts which heated.

Mr. Blackie said, with regard to the number of bull's-eyes stated to have been made in the trials of these weapons with rapid firing, he should be glad to know whether they were made at the commencement, at the middle, or at the latter portion of the firing. As the barrel of the gun became heated in parts, the bore was not the same throughout, because the barrel not being all the same thickness of metal, the thick portion was not heated so soon as the thin, and the thin part thus

became expanded. He thought this was a question which had not been considered, and it was necessary to find out whether the expansion and contraction of the barrel did not render it desirable that the barrel should be of equal thickness of metal throughout the whole length.

Mr. Kerr said that with regard to rapidity of firing, 50 rounds might be fired right off if there was sufficient strength of metal to stand it. But he apprehended this great rapidity of firing was not required.

Mr. Newby having given a description of the Jocelyn rifle,

Captain O'Hea, in reply upon the discussion, said, with reference to what had been stated by Captain Selwyn, he would give the calculation he made with regard to rapid fire, which he trusted would satisfy the meeting as to the efficacy of these weapons at short range. He did not pretend they were effective at long range. He supposed that troops in line would travel 75 paces in half a minute at "double quick," that would be 36 inches per pace. That was going an extreme distance for a charge. During the time the men were charging they could not fire, nor could they have skirmishers in front to cover them: so that the line which was receiving the charge would have plenty of time to deliver 15 rounds with good aim from these rifles; and if one round in 15, or even in 30, took effect, there would only be left half the number of men who commenced the charge. That was speaking of these weapons at short range.

The Chairman said he was quite sure the meeting would unite in thanking Captain O'Hea for this exceedingly interesting paper. He would not offer any observations upon it except on two very small points. One was with respect to the name which had been given to a cartridge now in common use, and which was the name of a Government officer. He thought it most unfortunate that a gentleman who from his position was called upon to judge impartially of the inventions of others should be himself an inventor, having personal interests involved which must naturally bias his judgment. The other point was one of a totally different nature. There was a commission for examining the 94 guns sent in for competition to the Government, but so many accidents had taken place in the trials of rifles—especially that lamentable one which occurred to Lord Bury—that a very useful suggestion had been made within the last few days, which would, no doubt, be carried out; that was, that inventors, who might be imagined to have confidence in their own productions, should themselves be called upon to fire the first rounds with their own weapons. He was sure that all present must feel indebted to Capain O'Hea for the very able manner in which he had treated this subject.

A vote of thanks to Captain O'Hea was then passed.

The following account of a trial of the Chassepot rifle, which recently took place before the Emperor of the French and Prince Oscar of Sweden, appeared in the *Times* of the 8th inst.:—"A battalion of the foot chasseurs of the Guard was placed at 600 yards from the mark, and the results obtained were quite extraordinary. After a period of precisely two minutes the trumpet sounded the call to cease firing. It was then found that the battalion, 500 strong, had fired 8,000 balls, of which 1,992 had struck the line of object aimed at. All the ground immediately in front of the mark was cut up by the balls in such a way as not to show a blade of grass left. The Emperor uttered an exclamation which graphically depicts the result, 'It is frightful! it is a positive massacre!' The battalion afterwards executed several times a similar exercise, but at distances increased to 1,000 yards."

Proceedings of Institutions.

Hastings Mechanics' Institution.—The thirty-fourth annual report to 1st May, 1867, says that a steady, onward movement of quiet usefulness is its chief characteristic; endeavouring to lead on the members to the cultivation of an elevated taste, having in view the primary objects of the Society rather than a pandering to the popular prejudices of the hour. Although the year just passed through has been one of undue commercial depression, the Institution has not materially suffered by it. The number of members is above the average of the last five years. The classes, the lectures, the reading-room are as well frequented as formerly, or even better. Among the lectures that have been delivered during the session may be mentioned one by E. Wheeler, Esq., F.R.A.S., on "Ocean Telegraphs;" one by J. C. Savery, Esq., "Explanations of the System of Examinations in Connection with the Society of Arts;" one by Mr. W. Ransom, on "The Spirit of Philosophical Inquiry;" one by Mr. G. St. Clair, F.G.S., "Curiosities of Light;" one by the Rev. W. Barker, on "Ancient Mythologies;" one by Mr. A. H. Wood, on "Combustibles and Combustion;" one by Elihu Burritt, Esq., on "The Benevolent Associations of the Day;" one by Mr. J. Banks, on "Water Supply, Drainage, &c.;" one by Mr. W. C. Beck, on "Oliver Cromwell." The classes have been in active operation during the winter. There are now in the borough men holding high positions, who are not ashamed to own the class-room of the Institution as the basis from which their upward career commenced. There are sixty-two names on the class list. The following classes are in existence:—Senior French, junior French, arithmetic, drawing, elocution. The committee have again offered prizes for proficiency, and the following gentlemen have acted as examiners:—Mr. Stewart for French; Mr. W. Ransom for elocution; Mr. Burgess for drawing; and Mr. Banks for arithmetic. Twenty-seven volumes have been added to the library, at a cost of £5 19s. 4d., and 3,249 volumes have circulated during the year. During the year 139 numbers joined and 96 left. The present number is 398, the average number of members during the last five years being 339. The committee have again, during the past year, united with the sister Institution at St. Leonards in carrying out a regatta fête. The lecture session was also opened with joint soirées; the first half-course being opened with a soirée in the Music Hall, Hastings; the second half-course with a soirée at the Assembly Room, St. Leonards. A plan was adopted whereby any student from the classes at St. Leonards should be examined at the class examinations, but none presented themselves from that Institution. The two Societies have again held a preliminary meeting, and have decided to hold a fête on the next regatta day. The committee "regret that the members continue to evince so much apathy as regards the examinations of the Society of Arts." They would gladly receive any hints from the members which would point out a mode of bringing about a more satisfactory state of matters. The Committee, in conclusion, congratulate the members on the continued success of the Society. "They might have initiated changes that would have made the Society more attractive to the thoughtless and the gay; but such a course would not have been so conducive to the real welfare of those who are and ought to be benefited by the operations of a Society of this sort." "The object of such an institution as this" (say the Committee), "should be the spread of education. To help the self-educating is the honourable aim of the institution." The balance-sheet shows that the receipts have been £238 1s. 2d.; that the expenditure has been £171 15s. 3d.; that there is a balance in hand of £66 5s. 11d.; and that the liabilities are *nil*.

PARIS EXHIBITION.

The beautiful weather which has prevailed since April has produced an extraordinary change in the Champ de Mars; the trees, shrubs, and grass are beginning to create something like harmony in the heterogeneous composition of the park, and the horticultural garden is rapidly developing its beauties; in another fortnight both (but especially the latter) will be delightful. The remaining unarranged portions of the Exhibition, within doors and without, are being got into order, some of them rather too gradually, and the amount and variety of the objects exposed are positively embarrassing.

Amongst the important additions made to the collection within doors during the last fortnight is that of the History of Labour, or Retrospective Museum, and although not complete it contains a most magnificent collection. The French portion is, of course, infinitely larger than that of any other country, and is admirably arranged; and there is this great advantage as regards the whole gallery—there is ample room between the cases, and the light is excellent. The French Commission is enabled to illustrate each epoch, from the age of bone and flint to the eighteenth century, very completely, and it is the first time that a great systematic exhibition of the kind has taken place; former retrospective collections have been crowded with beautiful or extraordinary productions, but this one represents very fairly the rise, progress, decline, *renaissance*, and many of the accidents in the history of handywork, and is thus an admirable school for the student in art-manufacture, while it indicates in a curious manner the tendencies and characteristics of the various ages.

Recent discoveries and discussions have given a special interest to the illustrations of the early ages of civilization; and the collection of bone, flint, and bronze arms and implements is remarkably fine. This applies not only to the French, but to every other department. Switzerland, for instance, contributes a choice collection from the lake-dwellings, with other antiquities of the kind.

There is, as yet, no catalogue of any division but that of England; the Danish catalogue as well as the Russian are nearly, if not quite, ready, but the French will take some weeks yet to prepare. Fortunately, the absence of catalogues is not a serious matter; special articles are generally labelled, and the great series tell their own tale.

The French department will be tolerably rich in all the grand divisions of decorative manufacture; the title, history of labour, is a misnomer; it should have been history of decorative art, for, with the exception of Prussia, there is no attempt to illustrate the history of any of the usual arts; in the early epochs there will be found some very curious specimens of pottery casts and bronze figures; the collection of enamels is remarkably fine, so is that of faïences; and that of china will be so when the two last rooms are arranged, which will only occupy a few days; the goldsmiths' art is fully represented in every epoch, and forms, altogether, a magnificent collection; this, of all other classes and other objects in the collection, presents the longest historical series. Denmark, Sweden, and Norway have highly interesting collections of a totally different type, and presenting more novelty to the great majority of visitors; old arms, breech-loaders, of the 15th and 16th centuries, and a small rifled cannon will attract great attention; Sclavonic art is generally well illustrated.

Holland and Belgium, Spain, Portugal, and Italy, have not yet opened their doors to the public, but the last-named will present a very beautiful collection of bronzes and terra-cotta, amongst other items.

Prussia exhibits no decorative art, but a most complete series of ploughs, from the earliest forms to those of the present day, by Dr. L. Rau. The models number nearly two hundred, and are perfectly executed.

The Russian court contains a highly-interesting collection, admirably arranged. It consists principally of old bronze work, jewellery, ancient arms and armour, curious plate, and some reproductions in plaster of the curious wood and stone carving of the Cathedral of St. Demetrius, and the churches of Saint John and Saint Isidore, at Rostov.

The British division completes the series worthily. It includes a small but choice collection of Celtic and Saxon ornaments, croziers, &c.; a series of casques of the most curious antique forms, with a few fine bits of armour; some magnificent chased, engraved, and jewelled gold, silver, and gilt work, including two silver tables, an immense silver looking-glass frame, and some noble specimens of plate sent by Her Majesty; some beautiful enamelled and chased work of the 14th and 15th centuries, English and Irish, and some fine examples of later date; some good specimens of Wedgwood, Chelsea, Derby, and Worcester ware, and other rare pieces of light-coloured Fulham stone ware. There is also a most curious exhibition of lace, selected from the collections of Mrs. Hailstone and the Nottingham School of Art, ranging from 1589 to 1800, and filling fourteen frames; and a very remarkable set of specimens of calico printing, ranging from 1760 to 1790, by the firm of Messrs. W. Bedford and Co., who were succeeded in their business by Messrs. Liddiard, and are now represented by Messrs. W. G. Cooper and Co.

Some manuscripts and other articles from the British Museum will complete the collection, which has been got together and arranged by Mr. George Wallis, upon whom it reflects great credit.

There is also a supplementary collection, which has already attracted the attention of all the foreign architects and artists, namely, a collection of photographs, with a few actual specimens of the marvellous architecture and ornamentation so little known to Englishmen, and, as a French artist expressed, a complete revelation for nearly all the rest of Europe. This collection has been arranged by Mr. James Fergusson, and forms an admirable pendant to the British gallery.

The picture galleries may now be said to be complete, with the exception of the placing the names and numbers on the frames, which is now being carried out; the last novelties there observed are eight frames containing some very curious specimens of Chinese art.

Additional interest has been given to the collection of pictures and drawings by the publication of the awards of the jury, which has been even more parsimonious than the Commission, the whole number of prizes awarded being but fifty-nine, or eight less than the number placed at its disposal.

Four of the grand prizes have been awarded to the French artists Meissonnier, Cabanel, Gérôme, and Théodore Rousseau; the four others to Leys, of Belgium; Kaulbach and Knauss, of Prussia; and Ussi, of Italy. First-class medals are given to Breton, Pils, Fromentin, Millet, Robert-Fleury, Brida, François and Daubiny, of France; to A. Stevens and Willems, of Belgium; Calderon, of England, Rosales, of Spain; Matejcko, of Austria; Horschelt and Piloty, of Bavaria. Second-class medals to Hébert, Corot, Jalabert, Jules Dupré, Brion, Gidé, Vauthier, Yvon, Hamon, Bonnat, Delaunay, and Rosa Bonheur, of France; Nicol, of England; Menzel, of Prussia; Sigismond l'Allemand, of Austria; and Claes, of Belgium. Third-class medals to Belly, Brisson, Charles Comte, Veffer, Baron, Bougereau, Levy, Cabals, de Curzon, and Puvis de Chavannes, of France; Adam, of Bavaria; Orchardson, of England; Gisbert, of Spain; Achenbach, of Prussia; Israels, of Holland; Wurzenger, of Austria; Faruffini, of Italy; Gonzalvo, of Spain; and the only prize for a water-colour drawing, to Walker, of England.

The horticultural competitions are going on regularly, and Messrs. Veitch and Son, of Chelsea-lane, won the first prize for a lot of fifty species and varieties of coniferous plants grown in the open air, and another first prize for new plants not yet disseminated.

The industrial juries have almost finished their examination, so that, with the exception of competitive trials in the classes of agriculture and horticulture, which will be spread over the whole period, the awards will all be made by the end of June.

The number of visitors is now very large, and the Exhibition has become the event of the day.

The following letter, addressed by Mr. Owen Jones, to the editor of the *Times*, will be found useful to all who visit the Exhibition:—

At the Exhibition of the Works of Industry of All Nations in 1851, the artistic world was startled by the revelation of the vast amount of elegance of design and propriety in its application exhibited in the works of the Oriental exhibiting countries. This impression was strengthened in the Exhibitions of 1855 and 1862, and in many directions the influence which Oriental art had exercised during the period which had elapsed since 1851 was recognised.

In the present Universal Exhibition of 1867 we still find India, Tunis, Egypt, and Turkey taking the highest rank in the application of art to manufactures. The shawls, carpets, mats, metal-work, and painted boxes of India; the embroidery of Tunis, and carpets of the Ottoman Empire, all exhibit the same unvarying principles of design, elegance, and refinement for which we sometimes look in vain in the art productions of European countries. By an unerring instinct and tradition they are able to apply ornament to the surfaces of objects they desire to decorate in the exact proportion and scale which the general form, material, and destination of such objects require. In the balance of colours, and in the distribution of lines of the ornament, they arrive at a perfection which it seems beyond the European mind to reach. To be fully satisfied of this it would be sufficient to compare the distribution of ornament on an Indian lacquer box of the humblest pretensions with the highest class enamelled works designed on Oriental principles exhibited by houses of justly European celebrity.

In the attempt which the French have made in the present exhibition to decorate some of the courts which contain the Oriental treasures in their own style we see how little the principles of decoration and ornamentation which the exhibited objects themselves display have been understood or appreciated by those who undertook the task. Ornaments have been misapplied in every direction, magnified from original sources out of all proportion, and mixed up with others of pure invention.

It would be a painful and invidious task to criticise in detail the decoration of these courts. To have rendered them worthy of the objects they enclose would have required years of preparatory study, and an amount of care and skill in the execution far beyond that which was at command, and which, perhaps, the temporary purpose which these decorations had to fill would hardly justify. I cannot therefore but regret that the attempt should have been made, feeling that it has cast an unmerited air of vulgarity over an art which is in reality so refined, and indisposed the casual observer to look within for that refinement and beauty which it overlays.

I am here led to the consideration of how far it is in any case desirable, in a building intended for such varied contents as an international collection, to attempt any decoration beyond that which the building itself may require; it is certainly not desirable to construct decoration.

In the building of 1851 there was, properly speaking, no decoration; beyond the colouring of the various constructive features of the building the objects exhibited were left to form the chief attraction, and themselves made up the decoration. In 1855 a little more was attempted; in 1862 too much, perhaps, of ornamentation, which in so vast a structure added little to the general effect that might not have been supplied as well or better by more simple means—in fact, the machinery annexe was an example of what might have been done with the main building in this direction.

The present building, from its peculiar plan and construction, may, for all practical purposes of effect, be said to have disappeared, as, with the exception of the grand avenue and the machine gallery, it nowhere enters into composition with the articles exhibited. It is not likely that the plan of this building would be followed in any future exhibition in England. The circular form evidently entails too many sacrifices of convenience and effect. But the zone system does appear to have many advantages, and we can conceive it carried out with parallel lines round a central hall with good results. In this central hall might be placed objects on which the various exhibitors might wish to stake their reputation and chance of reward, and which should have first passed a jury of selection. The present collection is too much like long lines of shops. Beside the many articles worthy of study there are far too many that a walk on the Boulevards would equally well bring to notice. Of course, exhibitors are desirous of showing examples of every variety of their manufacture; but international exhibitions should not be allowed to drift into mere commercial displays. They were intended to record the industrial progress of nations at various intervals of time, and objects which in no way exhibit this progress should be excluded, or, if that could not be done, they would, at least, find no admittance in our hall of honour.

We would venture to recommend the visitor who desires to study this exhibition with reference to the influence of art on manufactures, to commence his studies with the Oriental collections. When thoroughly impressed with the true principles of decoration and ornament, which he will find in these works, and carrying these principles in his mind during his visits to the collections of European countries, we feel assured that he will value these latter only so far as they observe the general laws of all art, which Orientals so instinctively follow—laws which were equally followed in all great periods of art, and which are to be found in all great works of the past. It is the neglect of these unvarying principles which leads so often to ugliness and bad taste in the incessant search of the present time after novelty, irrespective of fitness.

Doubtless the visitor will find throughout the international collection many objects to be admired, and many attempts to struggle against the fashion of the hour; but there are still by far too many violations of true art, too many instances of forms built up one on the other, without due regard to the proper transition from one form to the other; too many instances of impure form and discordant colouring; and we believe the visitor will return again and again to examine the lovely productions of the Indian looms, the delicate refined ornamentation of their metal and lacquer work. No object, however humble, appears to escape art influence. They seek not after novelty, yet every object is a new delight, as we feel how every touch of the pencil or the graver is directed by a mental action. Not a line is drawn that could be better placed in any other direction. Such as the mass is, so are the details. Not so with European works; they may more or less satisfy us, but there is always something to offend, and which we would desire to see otherwise than as we find it.

Fine Arts.

Additions to the Louvre.—Some recent acquisitions have been added to the galleries of the Louvre, including the "Birth of the Virgin Mary," by Murillo, and the "Sainte Appoline" of Zurbaran; three small works by Chardin; the portrait of Denon, the first keeper of the Louvre, by Prudhon; and a portrait of a woman by Madame Haudebourg Lescot.

A Centenarian Artist.—There are two pictures at present to be seen in the Salon, in Paris, painted by M. Jean F. M. de Waldeck, born at Vienna, in Austria, on the 16th March, 1766, and who was pupil of Vien, of David, and of Prudhon. These works were, according to the declaration of the artist, completed at the end of last year only.

Commerce.

Tea Cultivation in India.—It appears that there seems to be at last some likelihood of a settlement of this vexed question. A memorial from the tea planting interest in Eastern Bengal has been laid before the Government of India, and from the cordial reception accorded to the deputation, which was remarkably influential, representing eighty firms, thirteen companies, and six banks, the importance of the subject, and the magnitude of the interests involved in it, seem to be acknowledged by the officials. In urging their claims, not for any Government protection, but simply for permission to manage their affairs in the way most likely to be conducive to their own interests, the deputation refrained from imputing any blame to the Government, attributing their losses wholly to "mercantile speculation, bad management, and a malarious climate." As the same reasons for this reserve do not exist on the part of the public, inasmuch as they have no officials to conciliate, we *(Produce Markets Review)* need not hesitate to speak with more plainness on the subject, and to lay a considerable portion of the blame on the Indian Executive. If it be not in the power of Governments to aid the development of commerce, at least they should abstain from placing unnecessary obstacles in its path, and amongst these impediments the one-sided legislation on behalf of the coolies must undoubtedly be classed. Granted that the only object that the Government had in view was the protection of the inferior and weaker classes against the possible tyrannical exactions of the planters, still there were many other ways of effecting this desirable object without necessarily entailing ruinous losses on the planters at the same time. The most effectual means for facilitating communication between the coolies and the employers of labour would have been, as the memorialists point out, the formation of proper roads between Bengal and Assam or Cachar; as in that case all the expenses, risks, and diseases incidental to long voyages by steamer would have been obviated. "Tea coolies have to be recruited," we are informed, "kept in depôts in Calcutta or Kooshtea, conveyed in steamers to their destination, and exposed to the chance of neglect and the certainty of sickness, in a malarious climate, far away, in many cases, from public opinion, just as in the case of the colonies. It is true that self-interest in most cases, and high principle in a few, lead the tea-planter to care for a labourer whose importation alone has cost him £8 or £10, and without whom his garden would relapse into jungle. But certain as is the good treatment of the coolies on the whole, there have been cases of the opposite, and the interests of ill-paid and not always highly-cultivated assistant-planters in isolated gardens are not those of their employers, or at least so strong as to check occasional outbursts of temper. Government interference then is necessary, but only so long as emigration has to be carried on in crowds and river-steamers. The moment a road is made from Bengal to Assam, it is evident that coolies will find their way there just as they do to other districts. It is the old story of a want of communication, to which the Orissa famine, in its intensity and long continuance, may be traced no less than the Assam collapse." With a liberal disbursement of funds by the Indian Government for the formation of roads, all the evils alluded to above, and the necessity of any official interference with the labour question, would at once be done away with.

Cultivation of Hops.—Professor John Wilson, in his report on the agricultural exhibition held at Vienna last year, mentions that, along with the samples of Hungarian hops was shown a plan of the method of cultivation carried out at Bellye, adapted for all other districts where wood suitable for hop-poles is scarce. Wooden pegs or short stakes are driven into the ground, at such distances apart as it is intended to plant the vines; and at longer distances—usually about 20 to 25 yards—light poles are erected, with a height of from 12 to 15 feet above the surface, so that there are parallel lines all over the ground of short stakes or pegs placed at certain distances, and projecting about 8 to 12 inches in height, while parallel rows of poles, from 12 to 15 feet high, cross these at right angles, and at from 20 to 25 yards' distance apart. A stout wire is stretched horizontally from pole to pole all over the ground, while vertical wires or light rope, made of any suitable material, are attached to the pegs and carried up and fastened to the horizontal wires, thus offering a steady support to the hop vine during the period of growth. At harvest time the ropes are detached and carried to the picking stage with the vines, and the field cleared for the usual tillage operations without the trouble and expense of shifting, stacking, and resetting the poles. This plan has been carried out during several seasons at Bellye, and has been introduced into Wurtemberg. Baden, Bavaria, and other hop-producing countries, with satisfactory results.

Colonies.

English Capital in Australia.—From several sources of information it appears that English capital is finding an outlet in pastoral investments in Australia. Paragraphs have appeared in local journals announcing the transfer to British proprietaries of large squatting stations. This development has disclosed itself in Queensland, but to a much larger extent in Riverina. The movement is very desirable, and deserves every encouragement that can be given to it. An extensive transfer of stations to new and wealthy owners would be most beneficial. It would directly benefit nominal owners struggling with heavy liabilities; it would be advantageous to mortgagees, especially banking mortgagees, with advances locked up for indefinite periods, by bringing their capital once more within their reach and control; and finally (says a colonial journal), it would probably be a highly profitable mode of investment for the new purchasers if possessed of resources for properly and efficiently working these great properties. There are such solid profits to be made out of sheep and cattle stations, by persons with sufficient independent means, that once the introduction of English capital was set in motion its influx would be constant and regular. The sinking of wells and the formation of reservoirs would immensely increase the capability of the arid country now useless in the Riverine districts, and this is the preliminary outlay which many of the present station occupiers cannot afford. The loan and mortgage companies have done something in giving accommodation, but rich ownership would benefit the district more than the limited aid these corporations can give. The banks have lent millions of capital, drawn from Victorian depositors, upon the security of stations in Riverina. They should, by firmly applied pressure, compel squatting borrowers to throw themselves into the arms of a good class of purchasers.

Commerce between India and Australia.—An article in the *Madras Times* comments on some samples of wine lately shipped from Victoria by the Murray Valley Vineyard Company, and recognizes great improvement in their ripeness and quality, as compared with those for-

warded the previous year. It expresses an opinion that frequent drinkers of these unadulterated wines would prefer them to those of European vintages, adulterated to suit the English taste. It concludes by looking on to a not far distant time when India and Australia may be more closely connected by commerce than at present, and when the produce of Australian farms, runs, and vineyards will be exchanged for coffee, sugar, and other Indian productions.

Notes.

SCIENTIFIC SOCIETIES IN RUSSIA.—A Society of History was formed at the end of last year, in Saint Petersburg, with the view to the publication of materials relative to the history of Russia from the time of Peter the Great. The first meeting of the society took place on the 12th March, in the house of the Prince Gortchakoff, under the presidency of the hereditary Grand Duke; several important public documents were communicated to the meeting. The Geographical Society of Russia has been authorized to establish a section in the north-west, the seat of which will be Wilna; the chief object of this new section is to study the province in an archæological, statistical, and ethnographical sense. An ethnographical exhibition has been announced to take place at Moscow during holy week; the idea of thus collecting the illustrations of Slave ethnography has been very warmly taken up by the *savants* not only of Russia but of the adjoining populations speaking a Slave idiom; and it is said that the collection of drawings, photographs, arms, utensils, and other articles and illustrations, is extremely curious. Great arrangements were announced to have been made for the visitors expected from Austria and Turkey, who were to be lodged in thirty apartments prepared for them in the Hôtel Kochoreff.

MEDICAL CONGRESS IN PARIS.—A scientific medical congress is announced to open in Paris on the 16th of August, under ministerial patronage, to which all the medical world is invited. A committee, including Dr. Wurtz, dean of the Faculty of Medicine, Drs. Tardieu, Bouilland, and many more eminent physicians and surgeons, is appointed to organise the congress. The secretary, to whom all communications are to be addressed, is Dr. Jaccoud, of 4, Rue Drouot, Paris.

MONT CENIS TUNNEL.—According to the official report received by the Minister of Public Works at Florence, it appears that the boring works of the great tunnel of the Alps at Mont Cenis, on the north side of Modane, had passed, on the 8th of last March, the bed of quartz which had been met with in June, 1865, and they had passed through a schistose limestone, mixed, and were now in pure limestone. The length of quartz passed is 381 metres, approaching in a surprising degree to the 348 metres, estimated at the beginning according to the external appearances and the inclination of the beds. From the 8th of March the nature of the rocks has been always the same, and the advancement in the small tunnel, which in the quartz bed never exceeded on the average 15 metres a month, has almost entirely resumed its original progress. It is satisfactory to publish the results obtained in the two fortnights of March, results which show that the work of boring has gone on with regular development on both sides. Progress during the first fortnight in March in the small tunnel was—south side, 34·55 metres; north side, 19·37 metres. During the second fortnight in March—south side, 41·25 metres; north side, 38·17 metres. Total work in the month, 133·34 metres. Total length of the bored part—south side, 4,119 metres; north side, 2,528·25 metres; total, 6,647·25 metres. Total length of tunnel, 12,220 metres. Portions bored, 6,647·25 metres; remaining to bore, 5,572·65 metres.

INTERNATIONAL MONEY ORDERS.—In October, 1864, a convention was concluded between the French and Italian governments for the reciprocal transmission of money orders through the post offices of the two countries for the payment of articles bought in France and Italy by private persons. A statement of the amount of orders sent by the French Post-office to Italy and by the Italian Post-office to France, and paid, from the 1st of October, 1864, to the 31st of December, 1866, shows that in October, 1864, the month in which the convention was concluded, there were 933 orders, amounting in all to about 53,000 francs, sent through the French Post-office to Italy. In December of last year this had increased to 3,519 orders, amounting to more than 180,000 francs. The orders sent from Italy to France were in October, 1864, 920, amounting to 69,000 francs, and in December last, 2,395, amounting to about 194,000 francs. "There can be no doubt," says the Paris correspondent of the *Times*, "that a similar arrangement between France and England would be mutually advantageous, and there is no comparison between the quantity of articles bought by Frenchmen in England and *vice versâ*, and those between France and Italy. For the convenience of both post-offices it might be stipulated that 200 francs, or £8, should be the *maximum* of the money order. I am assured that the French Postmaster-General declares himself ready and willing to sign such a convention, but some of the officials of the English Post-office are opposed to it—why, I cannot say."

THE EMPRESS EUGENIE is preparing two collections of pictures and other objects connected with the Empress Josephine and Marie Antoinette. When completed they are to be open to the public during the Exhibition, at the palaces of Malmaison and the Petit Trianon.

MEETINGS FOR THE ENSUING WEEK.

MON.....Society of Arts, 8. Cantor Lecture. Mr. Chaffers, "On Pottery and Porcelain."
R. United Service Inst., 8½. Capt. T. E. Symonds, R.N., "The Combined End-on and Broadside System."
R. Geographical, 8½. 1. Capt. Sherard Osborn, R.N., "On Chinese Tartary." 2. Mr. A. G. Findlay, "On Dr. Livingstone's Last Journey, and the Sources of the Nile."
Society of Engineers, 7½. Discussion on Mr. Vaughan Pendred's paper, "On Water Tube Boilers."
TUES ...R. Medical and Chirurgical, 8½
Civil Engineers, 8. 1. Discussion upon Mr. Chance's paper, "On Optical Apparatus used in Lighthouses." 2. Mr. Edward Byrne, "Experiments on the Removal of Organic and Inorganic Substances in Water."
Photographic, 8.
Anthropological, 8.
Royal Inst., 3. Dr. Miller, "On Spectrum Analysis."
WED ...Society of Arts, 8. Mr. W. Fothergill Cooke, "On New Machinery for Cutting, Tunneling, Quarrying, and Facing Slate, Stone, and Marbles."
Pharmaceutical, 11. Annual Meeting.
THUR ...Zoological, 4.
Chemical, 8.
Syro-Egyptian, 7½. Mr. D. W. Nash, "On the Mutual Influence of Assyrian and Egyptian Civilisation."
Royal, 8½.
Antiquaries, 8½.
Royal Inst., 3. Prof. Huxley, "On Ethnology."
Numismatic, 7.
Royal Society Club, 6.
London Inst., 7. Prof. Bentley, "On Botany."
FRI .....Philological, 8. Annual Meeting.
Royal Inst., 8. Prof. Odling, "On the Absorption of Gases by Metals."
R. United Service Inst., 3. Captain G. Frederic Blake, "Military Law."
SAT .....Royal Inst., 3. Prof. Huxley, "On Ethnology."
R. Botanic, 3¾.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 18th April, 1867.

Par. Numb.
175. Savings Banks—Return.
185. Government Insurances and Annuities—Accounts.
226. Education (Ireland)—Statement.

Delivered on 20th April, 1867.

196. New National Gallery—Letter.
203. Army (Recruiting)—Recommendations.
205. Waterford County Election—Minutes of Evidence.
224. Registrars' Fees (Middlesex)—Returns.
234. Malt and Barley—Returns.

Delivered on 25th April, 1867.

139. Tancred Charities—Report.
195. East Kent, &c., Railways—Estimate.
200. Waterford County Election—Depositions.
216. Waterford County Election—Orders.
229. Hops—Returns.
232. Population, Inhabited Houses, &c.—Return.
Agricultural Exhibitions (Vienna, &c.)—Report by John Wilson, Esq.
Ionian Islands—Despatches as to the state of Corfu, Zante, and Cephalonia, since the withdrawal of British protection.

Delivered on 26th April, 1867.

121. Bill—Local Government Supplemental.
142. Imperial Guarantees—Return.
199. (I.) Oyster Fisheries (Ireland)—Application.
230. Army—Statement.

Delivered on 27th April, 1867.

113. Bill—Customs and Inland Revenue.
122. Railways—Scotland.

Delivered on 29th April, 1867.

39. Bill—Railways (Guards and Passengers' Communication).
105. ,, Master and Servant.
123. ,, Land Drainage Supplemental.
118. (I.) Gas (Metropolis)—Correspondence.
Public General Acts—Cap. 11 to 16.

Delivered on 30th April, 1867.

111. Bill—Education of the Poor.
46. (III.) Trade and Navigation Accounts (31st March, 1867).
235. New Courts of Justice—Correspondence.
The "Queen Victoria"—Correspondence (Part II.).

Delivered on 1st May, 1867.

125. Bill—Vaccination.
211. Tipperary Election—Minutes of Evidence.
Education—Returns for the years 1859-1866.
Japan—Correspondence.
The "Tornado"—Correspondence (Part VII.)
Public Petitions—Eighteenth Report.

Delivered on 3rd May, 1867.

128. Bill—Tramways (Ireland) Acts Amendment.
167. Queen Anne's Bounty—Return.
233. Rangoon and Western China—Further Papers.

Delivered on 4th May, 1867.

215. Iron and Machinery—Return.
257. Civil Services—Abstracts of Sums Voted "on Account," and the Sums required to complete the several Grants.
193. East India (Upper Burmah)—Papers and Correspondence.
Fisheries (Ireland)—Report of Special Commissioners.
New Zealand—Further Papers.
Public Petitions—Nineteenth Report.

Delivered on 6th May, 1867.

134. Bill—Meetings in Royal Parks.
78. (VI.) Committee of Selection—Seventh Report.
154. Metropolitan Police (1866)—Accounts.
231. Wrecks (Ireland)—Return.
240. Board of Trade (Meteorological Department)—Return.
The Holy See and Rome—Further Papers.
Charity Commission—Fourteenth Report of Commissioners.

Delivered on 7th May, 1867.

130. Bill—Pier and Harbour Orders Confirmation.
209. County Court Commitments—Return.
239. East India (Mysore)—Further Papers
242. Merchant Shipping Tribunals—Memorials.
255. Navy (First Class Boys, &c.)—Return.
256. Army (Snider's Rifle Ammunition)—Return.
259. Public Officers—Treasury Minute.
262. Constabulary (Ireland)—Return.
267. Railways (Session 1867)—Board of Trade Report.

Patents.

From Commissioners of Patents' Journal, May 3rd.

GRANTS OF PROVISIONAL PROTECTION.

Agricultural implements—1130—R. Boby.
Bathing apparatus—985—W. Clark.
Boxes—1144—J. E. Mellin and C. H. Ulbricht.
Clocks—1097—W. Clark.
Compasses—1098—R. Shortrede.
Cotton, &c., preparing—62—J. M. Hetherington.
Cotton, &c., preparing—1079—J. Higgins and T. S. Whitworth.
Cranes—1077—W. R. Lake.
Ear-stoppers—995—W. Clark.
Files—1112—G. T. Bousfield.
Fire-arms, breech-loading—1069—W. R. Lake.
Fire-arms, breech-loading—1075—S. Smith.
Fire-arms, breech-loading—1100—K. H. Cornish.
Fire-arms, breech-loading—1138—T. Horsley.
Fishing apparatus—1146—W. Wilkinson.
Fluids, measuring—1071—F. G. Fleury.
Furnaces—1142—W. Begg.
Iron, coating with zinc—1107—C. Crockford.
Iron, manufacture of—1087—W. H. Dawes.
Iron, &c., rolling—1095—T. H. Head.
Knife-cleaning machines—1126—J. Lewthwaite.
Latch, window—1106—R. S. M. Vaughan and A. G. Harston.
Locomotive figures, &c.—1083—J. J. Snow.
Looms—1063—J. Ratcliffe and G. Wolstencroft.
Looms—1092—R. L. Hattersley and J. Smith.
Looms—1140—W. and J. Holding.
Metals, cutting and polishing—410—J. Thompson.
Metals, grinding and polishing—1105—W. Gregory.
Metals, &c., oxidizing—1042—W. Henderson.
Mules, self-acting—1128—W. Weild.
Pans, cooking—1148—A. E. Griffiths.
Pianofortes—1136—A. N. Wornum.
Pressing iron—1065—F. Love, T. Davy, and J. Metcalf.
Printing machines—1093—C. H. Gardner and J. Bickerton.
Printing machines—1116—W. Clark.
Railway carriages, &c.—1110—J. Richardson and C. Greenwood.
Ranges—1103—J. Jobson.
Rudder pins, &c.—1108—C. Grace.
Screens, corn, &c.—1134—R. Boby.
Screws—1089—H. P. Boyd.
Sewing machines—1081—G. Slater.
Ships' propellers—1085—R. Courtenay.
Ships' propellers—1096—W. Clark.
Signals, railway—1032—J. Woods.
Stained glass, imitation of—1120—J. W. Breakell.
Steam engines—1124—D. Rankin.
Sugar, refining—1099—J. Aitken.
Tanning apparatus—1091—C. Wilmet.

PATENTS SEALED.

2871. J. R. Wigham.	2913. A. Giles and T. Sturgeon.
2877. W. E. Newton.	2928. H. A. Bonneville.
2886. W. Darlow and P. W. Seymour.	2966. C. Moseley.
	2976. J. F. Belleville.
2892. J. C. Newey.	2979. C. M. Bathias.
2893. J. and M. Deavin and J. H. Sutton.	2989. W. A. Lyttle.
	3040. W. Chambers.
2896. J. E. Brown.	3225. W. Guest.
2905. T. Kershaw.	614. G. Haseltine.
2908. J. Thomson.	623. W. E. Gedge.

From Commissioners of Patents' Journal, May 7th.

PATENTS SEALED.

2912. J. S. Cooke.	2949. J. Denley.
2920. S. W. Woodroffe.	2957. G. Crawshay & J. Thomas.
2921. J. H. Johnson.	2965. G. Whitehead.
2922. F. B. Dœring.	2973. F. W. Dähne & D. Thomas.
2925. A. Gobert.	2999. T. B. Taft.
2932. G. Little.	3004. E. Drucker.
2933. W. Robertson and C. J. Waddell.	3053. J. Tasker.
	3062. J. Barker.
2934. G. White.	3100. W. Botwood.
2936. F. B. Donisthorpe.	3133. W. R. Lake.
2939. T. Skaife.	3217. G. Haseltine.
2942. J. G. Tongue.	55. W. E. Newton.
2947. G. Crawshay & J. Thomas.	175. W. E. Newton.
2948. G. Crawshay & J. Thomas.	537. J. R. Cooper.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

2671. R. Broadbent.	1159. J. Cameron.
1257. A. B. Childs.	1132. J. Gardner, R. Lee, and G. H. Wain.
1612. W. Clark.	
1146. G. Hodgson and A. H. Martin.	1151. A. Barclay.
	1136. E. Beanes and C. W. Finzel.
1163. W. Powell.	1139. G. Haseltine.
1194. J., J., and J. Booth.	1142. J. J. Miller, jun.
1126. W. T. Henley.	1154. F. Martin.
1131. C. J. Richardson.	1162. J. R. Abbott.
1140. W. Simpson.	1165. E. Heywood.
1221. D. West.	

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

1124. J. Grimond.	1138. W. Evans.
1121. D. West.	1300. G. de Laire and C. Girard.

Journal of the Society of Arts.

FRIDAY, MAY 17, 1867.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'Clock:—

May 22.—Derby-day. *No meeting.*

May 29.—"On the Water Supply of the Metropolis in relation to the Conservancy of the Thames and its tributaries, and the demands of the Water Companies." By J. Bailey Denton, Esq.

Cantor Lectures.

The concluding lecture of Mr. Chaffers' course, "On Pottery and Porcelain," will be delivered as follows:—

Lecture VII.—Monday, May 20th.

English Porcelain.—Bow—Chelsea—Derby—Worcester—Liverpool—Wales—Plymouth—Bristol—Lowestoft—and other Manufactories—Battersea Enamel, &c.

The lecture commences at eight o'clock, and is open to members, each of whom has the privilege of introducing one friend.

Conversazione.

The Council have arranged for a Conversazione on Thursday evening, the 23rd May, at the South Kensington Museum, cards for which have been issued.

Artizans' Visits to Paris.

The Council of the Society of Arts, feeling the importance of promoting the intelligent study of the Paris Exhibition and the manufacturing establishments in France by artisans of the United Kingdom, have appointed a Committee in furtherance of this object. The following gentlemen constitute the Committee:—

Rt. Hon. C. B. Adderley, M.P.
C. W. Aitken.
Edward Akroyd, M.P., *Vice-Pres.*
Sir Wm. G. Armstrong, C.B.
A. S. Ayrton, M.P.
S. A. Beaumont.
John Bell, *Memb. of Council.*
Professor Bentley, *Memb. of Council.*
Lord Berners, *Vice-Pres.*
Hon. and Rev. S. Best.
D. Roberton Blaine, *Memb. of Council.*
W. H. Bodkin (Assistant-Judge), *Vice-Pres.*
Sir J. P. Boileau, Bart., *Vice-Pres.*
R. K. Bowley.
Antonio Brady.
Rt. Hon. H. A. Bruce, M.P.
Decimus Burton.
C. Buxton, M.P.
The Earl of Caithness, *Vice-Pres.*
Lord Eustace Cecil, M.P.
R. L. Chance.
Harry Chester, *Vice-Pres.*
The Masters of the City Companies.
Henry Cole, C.B., *Vice-Pres.*
Robt. Coningsby.
Rt. Hon. W. Cowper, M.P.
Sir Francis Crossley, Bart., M.P.
J. Bailey Denton, *Memb. of Council.*
Lord de l'Isle and Dudley, *Vice-Pres.*
The Duke of Devonshire.
Charles Dickens.
James Easton, *Memb. of Council.*
C. W. Eborall.
Lord Ebury.
Lord Elcho, M.P.
William Fairbairn, F.R.S.
Professor Fawcett, M.P.
Peter Graham, *Memb. of Council.*
The Earl Granville, K.G., F.R.S., *Vice-Pres.*
The Earl Grosvenor.
Mr. Hansard.
G. W. Hastings.
Wm. Hawes, F.G.S., *Vice-Pres.*
J. Pope Hennessy.
Sir Rowland Hill, K.C.B.
Chandos Wren Hoskyns, *Vice-Pres.*
T. Hughes, M.P.
Blanchard Jerrold.
Rev. C. Kingsley.
Hon. A. F. Kinnaird, M.P.
Lord Henry G. Lennox, M.P., *Vice-Pres.*
The Bishop of London.
The Sheriffs of London and Middlesex.
Rt. Hon. Robt. Lowe, M.P.
Lord Lyttelton, *Vice-Pres.*
Archbishop Manning.
Henry Maudslay, *Memb. of Council.*
Rev. F. D. Maurice.
The Lord Mayor.
J. Stuart Mill, M.P.
Rev. Dr. Miller.
The Bishop of Oxford.
J. Slaney Pakington, *Memb. of Council.*
Right Hon. Sir John S. Pakington, Bart., M.P., *Vice-Pres.*
Alderman Sir B. S. Phillips.
Sir Thomas Phillips, Q.C., F.G.S., *Vice-Pres., Chairman of the Council.*
The Duke of Richmond.
Rev. W. Rogers.
The Marquis of Salisbury, K.G., *Vice-Pres.*
Titus Salt.
Sir Francis Sandford, *Vice-Pres.*
Colonel Scott, R.E., *Memb. of Council.*
The Earl of Shaftesbury.
Benjamin Shaw, *Memb. of Council.*
Sir J. P. Kay Shuttleworth, Bart., *Vice-Pres.*
S. Smiles.
Seymour Teulon, *Treasurer.*
Thomas Twining, *Vice-Pres.*
Alderman Waterlow, *Memb. of Council.*
E. W. Watkin, M.P.
G. Watts.
George F. Wilson, F.R.S., *Memb. of Council.*
Vice-Chancellor Sir Wm. Page Wood, F.R.S., *Vice-Pres.*

The Council, on the recommendation of the Committee, have passed the following minute:—

At the last and former International Exhibitions held in this country, arrangements were made by the French Government, to facilitate the visits of skilled artizans, and interesting reports on the exhibitions were made by them to their government. Believing that such visits on the part of skilled workmen to these great international displays not only exercise a beneficial influence upon the men themselves, but also upon the progress of industry in the country to which they belong, the Council of the Society of Arts have resolved to raise a fund to be employed, in aiding a limited number of English workmen to proceed to Paris for the purpose of studying the present French Exhibition.

To carry this object into effect, they have agreed on the following plan:—

1st. That a number of selected workmen (the number to depend on the amount of funds at the disposal of the Council) shall be assisted to proceed to and remain in Paris a sufficient time (say three weeks), for the purpose of making a careful study of the exhibition, and of such factories and workshops as they may desire to visit.

2nd. That every man so assisted shall, on his return, make a report to the Society of what he has observed during his stay, in reference to the special industry in which he is engaged, and that it be made a condition of the grant to each man that one-third of the amount be retained until his report shall be supplied to the Society.

3rd. The Council think it will be undesirable to fix the exact time for, or to prescribe the duration of, these visits, or to interfere with any of the arrangements the

men may desire to make for their own accommodation; but, in order that they may take advantage of the facilities provided by the Commission organised by the French Government for the study of the exhibition, the men will be placed in communication with that Commission on their arrival in Paris.

4th. A considerable sum will be required satisfactorily to accomplish the important object undertaken by the Society, and, in order to raise these funds, the Council have determined to appeal to the members of the Society, who must be interested in the successful results of this movement, in the belief that they will not hesitate to join in a subscription for the furtherance of the undertaking; and they propose at the same time to communicate with the various Chambers of Commerce, inviting their counsel and support. The Council have decided to commence the subscription by a vote of one hundred guineas from the funds of the Society.

Members are invited to aid the Council in this undertaking by subscriptions, which should be forwarded to the Financial Officer at the Society's house.

Harvesting of Corn in Wet Weather.

The Council of the Society of Arts have resolved to offer the Gold Medal of the Society, and a Prize of Fifty Guineas, for the best Essay on the Harvesting of Corn in Wet Seasons.

The first part of such essay—after noticing the various systems at present adopted in damp climates for counteracting the effects of moisture upon cut corn in the field, and for avoiding such exposure in wet seasons by peculiar harvesting processes—should furnish a practical and analytic exposition of the best available means:—

1st. Whereby cut corn may be protected from rain in the field.
2nd. Whereby standing corn may, in wet seasons, be cut and carried, for drying by artificial process.
3rd. Whereby corn so harvested may be dried by means of ventilation, hot air, or other methods; with suggestions for the storage both in the ear and after threshing.
4th. Whereby corn, sprouted, or otherwise injured, by wet, may be best treated for grinding or feeding purposes.

The whole to be supplemented by a statement of practical results, and actual cost of each system described; and authenticated estimates of any process proposed for adoption, based upon existing but incomplete experiments.

The above requisitions are given suggestively; not to bind the writer to the order or to limit the treatment of the subject, provided it be kept within the scope of practical experience and utility.

The essays must be sent in to the Secretary of the Society of Arts on or before the 1st of January, 1868.

The Council reserve the power to withhold the whole or part of the prize, in the event of no essay being, in the opinion of the judges, of sufficient merit.

Subscriptions.

The Lady-day subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Food Committee.

A meeting of the Sub-Committee on Meat was held on Wednesday, April 17th, at which there were present Mr. Benjamin Shaw (in the chair), Mr. J. Ware, Mr. Harry Chester, Professor J. Wilson, Mr. Ludford White, and Mr. E. Wilson.

Mr. Henry Grainger, having attended upon the invitation of the Committee, stated he had been for many years engaged in the foreign provision trade in London and in Liverpool, and was three years since President of the Liverpool Chamber of Commerce.

The Chairman explained to Mr. Grainger that the object of the Committee was to inquire how far, and from what sources, the supplies of nutritious food for the labouring classes in this country could be increased and cheapened; and Dr. Edward Smith, having, in his book, "Practical Dietary," mentioned bacon, and particularly American bacon, as a valuable article of food, the Committee would be glad to hear whether, in Mr. Grainger's opinion, the importation of that commodity could be increased, and whether it could be made a good and useful article of food at a low rate?

Mr Grainger replied that the quantity could be increased indefinitely; but it was a question of price. As far as his own experience went—and that had been very extensive—he had never been able to get from any part of the world salt beef which the English people would eat at a low price. During the late American war, he said, when the Southern markets were closed, very large quantities of American bacon were exported to this country, at a first cost of threepence per pound. Since the close of the war the price had advanced considerably, the first cost wholesale being, in round figures, fivepence per pound by the hundredweight or ton. The quality of the bacon sometimes varies, but is tolerably uniform. The present price of American bacon was from 40s. to 50s. per cwt., according to the quality of the meat; the retail price would be from 6d. to 7d. per pound. English or Irish bacon was from 2d. to 3d. per pound dearer. American bacon is never considered to be of so good a quality for consumption in this country as English or Irish cured. One reason is, the Irish bacon, from the rapid means of conveyance, can be more mildly cured, whereas the American bacon, having to come a considerable distance, requires a stronger cure, and is very salt. The English people like things mild, and will not eat very salt meat of any kind. The Irish cured bacon is more adapted for our consumption, and the best qualities form an article of luxury on the breakfast-table. As far as he was aware, no attempt had been made to send meat from America without salt; he did not think it would answer, owing to the extreme fastidiousness of the people in respect of food. Although the very finest quality of salt beef was offered in establishments in various parts of the country at 3d. per pound it was a total failure; the miners and colliers would not eat it; that was meat which came from the United States, and of the primest quality, but highly salted, which prevented its sale. The salting went beyond the ordinary salting of meat in this country, but not beyond that which was supplied for cabin provisions of first-class ships. He believed the present supply of American beef in this country was not large, and such as was on hand was rather dear; the price of ship's beef varying from 4½d. to 6d. per pound, bought as ship's stores. Some of the meat was without bone; but, strange to say, preference was given to meat with bone for ship's use. He would be happy to send a piece of this description of beef for the inspection of the Committee, and it would be found to be of a quality of meat

equal to anything that could be obtained in Leadenhall-market, and not more salt than the Committee would like for their own eating. In troop and emigrant ships they would find beef of very fine quality. He had seen specimens of the Australian cooked beef, which had lately been imported into this country, in cases hermetically sealed, but he very much doubted whether it would ever acquire a large consumption by the people here. Salted meat in the raw state from Australia and South America, was at one time sent over in large quantities, but it was a perfect drug in the market. Such provisions were very rarely purchased by the public. At the principal places of preparation of such meat—beef and pork—as he (Mr. Grainger) had spoken of, it would pay the people to produce the raw article in the Western States of America to sell it at 2d. per lb., but of late years they have obtained a higher price than that both for beef and pork; but it could be produced there at 2d. per pound. A half-penny per pound would cover the expense of carriage from the Western States to the seaboard, while the cost of the sea passage and charges would be equal to another half-penny per pound. The quantity of bacon was larger last year than in the previous one, though it was nothing like the maximum during the American war. He believed the quantity could be increased indefinitely if there were the means of paying for it. For his own part, he decidedly preferred, for his own eating, pork fed in England or Ireland, from the fact that the American pork was, to a large extent, fed upon Indian corn, which made a rich meat, with a great tendency, from its richness, to turn rancid, when prepared as bacon. The over-greasiness of the American bacon was one objection to its use in this country; the want of firmness in the meat he attributed in a great measure to the way in which the hogs were fed. After "priming" in the woods, they were turned into the maize-fields, where they got a second feeding, and the result was one portion of the fat was hard and the other soft. With the corn-fed hogs, the whole of the fat would be firm, and a proper firmness of the meat was a test of its quality. The fat should be firm to the touch and the lean tender.

The Chairman asked Mr. Grainger whether he looked to future large importations of either meats?

Mr. Grainger replied there were very large cattle raisers, and large quantities of salt meat were now shipped to this country. The great centres of the trade were Cincinnati and Chicago, the latter having taken the lead. About three-fourths of the exports were consigned to Liverpool, and one-fourth to London, but a great deal was sent by railway from Liverpool to London, so that the relative consumption of the two districts could not be estimated on that account. He thought the amount of curing that was sufficient to preserve English and Irish bacon would be sufficient to preserve the American bacon during the short time that was necessary for its transit from the Western States to this country, but not for keeping during the time it had to be held for distribution in this country. The curing for two or three months produced the supply for twelvemonths, and mild cured bacon would not keep good for that time. The Irish bacon was not thoroughly cured, but thoroughly cured bacon would keep for any length of time without becoming tainted. Large quantities of pork were sent from America, as barrelled pork, in wet pickle, which was very good indeed, and met with a ready sale. He saw some of this description of pork the day before, the price of which wholesale was 5d. per pound. It was frequently sold by the retailers. It was not so salt generally as the American bacon; only moderately salt. There were other large markets for American meat besides our own; and very low prices in this country would be prohibitory to its importation, whilst better prices could be obtained elsewhere. If we were willing to give good prices there is no limit to the quantity they could send. Large quantities of bacon are imported from the north of Europe, from Denmark, Holstein, and Hamburgh, which in quality compares favourably with English and Irish, and the difference in price is only about a half-penny per pound. The price was the great criterion of quality.

The Chairman asked Mr. Grainger whether he agreed with the following passage in Dr. Smith's book on "Practical Dietary," with regard to American bacon:—"The economy of bacon depends upon the price which is given for it. Thus, when 9d. per lb. is paid as a medium price for English or Irish dried bacon, the amount of nutriment which can be obtained for 1d. is only 530 grains of carbon and 11 grains of nitrogen; but American bacon, in a somewhat less dried state, is sold at 3½d. and 4d. per lb., and at the latter price would offer 1,070 grains of carbon and 20 grains of nitrogen. The flavour of the latter is seldom so good as that of the former, since in the western parts of America the hog is chiefly fed upon acorns, hickory nuts, and other seeds called 'mast,' in the woods, and the curing is seldom so carefully performed as in this country; but when a fair sample of it is procured it is an agreeable food, and is far more economical than the English or the Irish bacon. From the imperfect feeding of the American pig, a large proportion of the fat runs out of the bacon when it is boiled, and the piece shrinks in size, so that the housewife cannot cut so many slices from a given weight; but if the liquor is made useful as food this is only an apparent and not a real disadvantage. There is at least five per cent more water in American than in well-cured English bacon."

Mr. Grainger remarked that the method of feeding above described was formerly adopted, but had been to a great extent discontinued, as the people would not eat the acorn and mast-fed pork, and it was no longer imported into this country. If it were it would be unsaleable. To show the truth of Dr. Smith's observation, it is the fact that the Irish producers ship all their superior qualities of bacon to our markets, and import largely American bacon from Liverpool for home consumption. They did not mind its being a little greasy; what we regarded as the impurity of the article appeared to be a recommendation with them in the way they use it. They preferred giving 1d. per lb. less for American bacon, and shipping their own produce to England and getting a higher price for it. The Irish people are large consumers of American bacon. At the present time there was a better system both of feeding and curing pigs in America than formerly, and there was no fault to be found with either. Still, the American bacon was inferior to both English and Irish. The American pigs were more quickly fattened, and consequently became rancid by keeping. One would eat a portion of American bacon, and pronounce it good, but would not ask for more. There was no particular fault to be found with it in the eating, but it was not appetising.

Professor Wilson said during his visit to America he made it his business to inquire into the method of feeding and curing pigs in that country, and he found that the great bulk of the animals were fattened upon Indian corn. On the western prairies, where the soil would not grow wheat, Indian corn was cultivated in large tracts, and it was grown there to an extent that could hardly be conceived. He had seen maize crops from 12 to 14 feet in height. It was so for many miles. The farmers could not send it as corn to the market, and they turned hogs into these corn tracks by hundreds and thousands, and thus they carried the Indian corn to market in the shape of pork. That was what they called "condensing" it as pork. The hogs when fatted were sent to the large killing and curing establishments at Ohio, Indiana, and Terre Haute, to be made into bacon, and dried for home consumption. This pork was all of superior quality, being fed upon Indian corn. No better food could be given to the animals than the Indian corn, mixed with the juicy and sweet stems of the corn; but the pork was considered to be too rich for the

English palate. Pigs fed on potatoes and meal fatten slower; the fat is firmer, and the meat nicer eating. Some of the hogs were brought to as much as 200 lbs. weight. The factories were several stories in height. The pigs were driven up an inclined plane to the top floor. They were then placed together in rows, and then two men ran along on the backs of the pigs, with little pole-axes, and hit them on the head like playing musical-glasses. In this way they were taken to the top as live pigs, and, passing through successive stages, reached the bottom as cured pork, ready for drying as bacon. The system had altogether been brought to very great perfection.

Mr. Grainger observed, with regard to beef from South America and Australia, various attempts had been made to salt it and send it to our markets. The cattle were in the best condition for slaughtering, at a time of the year when the temperature of the climate was too high to admit of mild salting or pickling. If they deferred the salting till the winter time the meat would be in such a thin and lean condition that it would not be acceptable in this country, and thousands of packages have been sold here for less than the value of the casks. It might naturally be supposed that they could prepare that beef and send it over in great quantities; but owing to the climate, at the time the meat is in best condition, it could not be cured in the usual way. This remark applied equally to South American and to Australian beef. He had seen meat salted by the injection process of Dr. Morgan. That process had been partially successful; so much so that what was formerly sold at a guinea per tierce, from the peculiar state of the market, rose to 85s. per tierce, or about 3d. per pound. That was pickled in salt. Some of the beef and mutton sent from Australia had been sold here. The cooked canister beef prepared by Tindal's process he did not think would ever become of large or general consumption in this country by the lower classes. It would no doubt be used to a certain extent; as a little change from salt provisions it would be agreeable. He believed it had been found out that in these tins certain gases are generated, which produced dysentery when used to any large extent; and therefore it would not do to introduce it largely into the commissariat of an army. This remark, he believed, applied more or less to all meat preserved in tins. It was not, in fact, wholesome as a general article of diet. That was what he had heard. It might be used as an occasional change of diet, but should not be make a frequent article of food. The effects were seen in the provisioning of the troops in the Crimea. He believed there was a little selling now. All attempts of this kind had been failures, partly because when a tin was opened it required to be used immediately, and if kept it became spoilt. The Government were now preparing largely for themselves provisions for the navy, although it was done at an expense considerably above what the same class of provisions might be bought at, with the pick of the market.

Mr. Ludford White said he could contradict from personal experience the statement that the preserved meat would not keep when the tin was opened. He had kept the meat good for a week in an ordinary larder.

Mr. Grainger believed, if it could be sold at the counter at 6d. per pound, there would be a demand for it. It was astonishing what a difference a penny per pound in bacon made in the consumption. American bacon, to meet with a sale in this country must be put on the counter at 6d. per pound. At the present time they could not dispose of any large quantity of American bacon at 7d. or 8d. per pound. If it could be sold retail at 6d. per pound he had no doubt four times the quantity would be sold. It made a difference of 300 per cent. in the consumption. It was easy for a person with technical knowledge to distinguish between cooked English and American bacon. He would not like the latter so well as the former. It was not prejudice, but there was that real difference which would lead to preference for the one over the other. The best English and Irish bacon was at the present time 8d. per pound wholesale, and the retail price 10d. The only way to increase the consumption would be to increase the wages of the working classes, so that they might have the means of purchasing a fair proportion of the home as well as foreign produced meat. It was merely a question of price. If the price could be paid we might have meat from all parts of the world. In the words of the Americans, they could send us enough meat to sink our little island entirely. Probably as much meat might be sent from the banks of the Danube as from those of the Mississippi, but the cost of transit was a bar to the large exportation of it to this country.

Mr. Chester inquired whether any importations of pork were received from Spain?

Mr. Grainger replied it was rarely the case; there had been beef sent from Spain, but the price was high.

Mr. E. Wilson inquired whether any large supplies of beef had been received from Denmark?

Mr. Grainger replied very little direct. It was mostly sent to Hamburgh, and thence to this country.

The Chairman asked whether the same difficulty with regard to climate, which had been mentioned, existed with regard to Buenos Ayres?

Mr. Grainger believed it did. A company was formed in Monte Video for the preparation of meat, with some promise of success. He apprehended that a modification of Morgan's process might answer. He had seen a great many tierces of it. There seemed a probability of making a perfectly cured article. The meat was by no means so salt as that termed "junk," and a good price was given for it. Up to the present time it was liable to suffer injury in crossing the line, and required to be put in proper order before it was used. He referred to Queensland. It was obvious the cattle would be in the best condition when there was most grass for them to eat. There were no stall-fattened cattle there, consequently they were fattest when there was abundance of grass, and that would be in the early part of the summer, when it was too hot for curing in the usual way.

Professor Wilson said but for the difficulties of transit no doubt we could obtain any amount of provisions from the Lower Danube. There was an attempt made at it last year. Two fat oxen were slaughtered at Vienna, and sent express to London. The meat arrived within 50 hours after it was killed, and a joint was soon after put down to the fire to roast. The price obtained was 6¼d. per lb. Seeing that meat was selling here at 10d. per lb. it was an inducement to try the experiment. If it answered they could send a hundred or two of fat cattle per week.

Mr. Grainger said the largest importation of American bacon was 500,000 boxes, of 400lbs. each. That was in the second year of the American War. Last year it amounted to only about 70,000 boxes. The quantity had been much less since the end of the American War. In reply to questions put by Mr. Wilson, with regard to the relative price of English and American cured hams, Mr. Grainger stated that there was a more marked difference in the price of hams in favour of the former; American hams were for the most part unsaleable in this country. The legs sold better as wet pickled, but when they became hard, as hams, the people would not eat them. In fact it must still be borne in mind that the whole curing for the year must be done in two or three months, while the consumption extended over the whole year. He had remarked that the trade in American bacon began with a relish and ended with a nausea. He had seen fresh American hams almost as good as English.

Mr. Chester asked whether there was not a great increase in the importation of American cheese?

Mr. Grainger replied, the increase was very great indeed, and the prices had risen, in consequence of the improvement in the quality and in the manufacture that had lately taken place. The difference was only 2d. per lb. between the finest American and the finest

English cheese. The average quality was now very nearly equal to that of Cheddar. This was mainly due to the improved manipulation of the cheese, and Mr. Grainger explained that the plan had recently been adopted of establishing a cheese-factory for a whole district, instead of each person making his own cheese. The arrangements for the purpose were of the most perfect description, and by that means an uniform quality of cheese was obtained, instead of great variety of quality according to the individual methods of manufacture adopted. Each farmer delivered his quantity of milk at the factory every day, of which a record was kept. The factory was superintended by a man of practical knowledge and ability, and the result was American cheese had become, from its greatly improved quality, a very favourite article in this country. The demand for it was increasing, and the price had risen to nearly double what it was a few years ago. This system of manufacture had been adopted in most of the dairy districts of the American states. There were large factories of this kind in the State of New York and in Ohio. In a country where skilled labour was scarce, the mechanical appliances and methodical system of manufacture such as he had mentioned were evidently of the greatest advantage. The bulk of cheese was sold at the end of the season, and a *pro rata* division of the proceeds was made according to the quantity of milk sent in by each person. He believed the American cheese would have a very sensible effect upon the home manufacture, as the public would not select cheese below the quality of the best American. The American article had now established itself side by side with other articles in the provision markets of the country. Some of the cheese was made in English-shaped moulds; but American cheese was always distinguished by being wrapped in coarse canvas. Some cheese had been received from Sweden; that was not wrapped in cloth like the American, and he had sold some of it as high as 78s. per cwt., which was about 4s. above the price of American. It compared favourably with the best Cheddars. The importation of provisions from Canada was considerable, consisting of beef, pork, cheese, and a large quantity of butter. There were no climatic difficulties to contend against, as was the case in tropical latitudes. The resources of that country were rapidly developing. The head quarters of the export trade were Toronto, Hamilton, and Montreal. The transit had been the hindrance to larger exportations. Nothing was exported to this country from French Canada, and Newfoundland was a large importer of provisions from us and other countries. There was great hope from the development of the provision trade in Canada, as the articles were of a character which suited our markets. Self-interest, however, would lead them to produce an article that would suit our markets as nearly as possible, and there was every encouragement to improve the quality. They were quite aware of the necessity of salting as little as possible. Self-interest teaches people all these things. The love of making money is a greater stimulus than could be given by the action of this or any other committee; and looking to that they naturally made themselves acquainted with the best mode in which things are to be done; and it was not to be imagined that they were deficient in chemical as well as practical knowledge on these subjects.

The Chairman asked if there had been any attempt to preserve provisions from Canada otherwise than by salting?

Mr. Grainger was not aware of any; it would hardly pay them, he thought, to do so. In the matter of fresh preserved provisions it was entirely a matter of confidence in the manufacturers; and in the provisioning of a ship with such stores confidence in the article was of the greatest importance; and people preferred paying a higher price for that in which they had confidence rather than trusting to that which was cheaper. If a method of preserving provisions in a fresh state were discovered, as compared with salted meat, it would be a question of relative price. The government used formerly to enter into contracts for the supply of meat for the navy, but latterly they had been induced to cure the meat for themselves. He thought this would, before long, be found to be a mistake; looking to the fact that a large quantity must be spoilt. The reason alleged for taking that course was that they could not depend upon the quality of the provisions supplied by the contractors, and they must take care that the soldiers and the sailors were well fed. He believed the present system involved double the cost, and that no better article was secured than would be the case under the contract system, under which the most rigid inspection was instituted.

Mr. Wilson asked whether, from Mr. Grainger's experience, there was a possibility of preserving meat for a long time without so charging it with salt as to cause it eventually to assume the character of "junk."

Mr. Grainger considered it must necessarily be over salted. In some cases, according to climate, the meat might be more mildly cured, perhaps, than it was, but that would render rapid consumption necessary. He thought Morgan's process gave promise of success; if they could effect in a few days a salting which required several weeks under the ordinary processes, it must be considered an advantage. In the curing of Irish bacon in the hot weather, the temperature of the curing-house was artificially cooled. In reply to further questions on the subject of Irish cured provisions, Mr. Grainger stated his opinion that Ireland could never enter into competition with America in the article of beef, even if it were sent to this country in a very slightly salted condition; the price obtainable for fresh meat would be a bar to such a competition; and from the injury which cattle were said to receive on the passage from Ireland, it was better, perhaps, to bring the meat over dead. The steam communication from Milford offered considerable facilities for the carcase meat trade with Ireland. No doubt the risks of injury to live-stock were considerable, sea and land passage having to be encountered. With the increased means of transit that were being developed at the present time, no doubt other sources of supply of meat to this country would be opened out. If Hungary had a railway system it would be capable of sending considerable quantities of meat to England, but they wanted the means of transit, and the cost by railway would probably not be more than ten per cent. The salt-beef trade from Ireland might be considered as extinguished. The live-meat market was open to them, and the prices were very much assimilated to those here. The agencies already at work were, in his opinion, sufficient to produce the most economical results that could be desired; and he thought there was no room for anything further to be done in that direction. The powerful agency of self-interest was at work amongst producers as well as consumers. He did not think it was possible to suggest anything that was practicable beyond what had been done already. In reply to further questions with regard to the adulteration of butter, Mr. Grainger expressed his opinion that no foreign substances were introduced into the butter sold in London and elsewhere, and the only adulteration was that of the salt pickle, which gave weight to the article and added to the profits of the producer, but that had been carried in some cases to an extent which defeated itself.

Cantor Lectures.

"On Pottery and Porcelain." By W. Chaffers, Esq.

Lecture VI.—Monday, May 13.

English Pottery.

Mr. Chaffers commenced his sixth lecture by alluding to the drinking vessels which were in use in England previously to the 16th century. They were of a very

coarse description, rudely fashioned, and usually devoid of ornament, but occasionally covered with a yellow or green glaze, and sometimes cast in a mould in grotesque forms. Numerous specimens of early English cups are found in the excavations made in the metropolis for the construction of sewers and large buildings, which may be, in many instances, identified by comparing them with the vessels depicted in mediæval manuscripts. But many other materials were used at the same period, and fashioned into drinking cups. The mether, a vessel made of wood, is frequently found in the bogs of Ireland, and, being of a square form, required some dexterity in drinking from without spilling its contents. In England the Peg tankard was much used in convivial parties. It was so called from a number of small pegs placed at equal distances to regulate the quantity to be taken by each person; these were frequently handsomely carved with religious subjects. Another description was the mazer bowl, so called from the German word *mæser*, signifying maple. Leather bottles, Venetian glass, cocoa-nuts, and other vessels constructed of a hard rind or shell, frequently mounted in silver, were also used. For plates and dishes a harder and more durable material was required, and wooden trenchers or pewter platters were generally in use. The vessels made in England were badly burned and not very durable, so that the German stone ware with a salt glaze was in general use throughout the 16th century, and was imported in large quantities. These stone pots were usually impressed in front with the arms of some German town, or other device, as a rose, &c., and under the spout was a ferocious bearded visage. They were derisively called "Bellarmines," after the celebrated Cardinal Bellarmine, who, in the 16th century, made himself so conspicuous by his zealous opposition to the reformed religion. It was not till the 17th century that stone ware pots were made in England of sufficient strength and cheapness to compete with those of Germany. In 1626 two Englishmen, named Rous and Cullyn, obtained the first patent for making stone pots and jugs, but, from their inferiority, the demand was not very great for them. The most successful imitation of the Grès de Cologne was made by John Dwight, of Fulham, which, in course of time, almost wholly superseded the importation of it from Germany. The Fulham stone-ware is frequently seen at the present day in collections; it is of exceedingly hard and close texture, ornamented with a blue or morone enamel in leaves and flowers, having in front medallions of the Kings and Queens of England, or their initials only. Mr. Chaffers alluded to a very interesting collection of specimens of the pottery made at Fulham, which were obtained by Mr. Baylis, of Prior's Bank, from a descendant of the Dwight family. Among these are some beautifully-modelled busts of Charles II. and James II., full-length figures of heathen deities, and various other objects, which show the perfection to which the manufacture had arrived. Dwight's first patent is dated 1671; at its expiration it was renewed for fourteen years longer. The next important pottery in England was at Lambeth, established about 1650, for the manufacture of Delft ware. The trade flourished here for more than a century, until about 1780, when the Staffordshire potters, by the great improvements they had made in the quality of their ware, and its cheapness, completely beat the Lambeth potters out of the field. Mr. Chaffers next passed in review the manufactures of Yorkshire. That of William Wedgwood, at Yearsley, about the year 1700, was the earliest of which we have any record, but a century later the well-known Leeds ware was made by Messrs. Hartley, Greens and Co. It is of a cream-coloured glaze, with much perforated or basket work sharply cut round the borders. The other manufactories were at Castleford and Rotherham, but the most important was that at Swinton, under the patronage of the Marquis of Rockingham, established in 1757. The well-known Rockingham teapot, of a chocolate colour, lined with white, had a great sale; but ornamental ware of a more artistic character was also made. Early in the 18th century Liverpool was the great centre for the manufacture of pottery, and in the first half of the century both fayence and porcelain were extensively made, both for home consumption and for exportation to the American colonies. About this time there was a large demand for punch bowls, and as these formed the principal ornaments on the side-boards of the middle classes, and especially on board the ships which were constantly going and coming in the port, considerable pains were bestowed in decorating them, and many are still preserved, painted with ships, convivial mottoes and inscriptions, flowers, &c. The principal potters were Alderman Shaw, Mr. Richard Chaffers, and Messrs. Sadler and Green, the inventors of the method of transferring prints from copper-plates upon pottery, perfected in 1756, and of which Wedgwood, as well as many other potters, availed themselves to decorate their wares. Towards the end of the 18th century the trade gradually left the town, not being able to compete with Staffordshire in the prices, and only one establishment of any importance survived, viz., that called Herculaneum. Swansea was next noticed, established in 1750, its most flourishing period being in 1780, while under the management of Mr. George Haines; it was continued by Mr. Dillwyn. Some of the earlier ware is very elegant in form and of a deep-blue glaze, and is what was termed opaque porcelain, carefully painted with birds and flowers. The lecturer then alluded to the rude and coarsely-painted ware made in Staffordshire previously to the year 1700, the ornaments being merely coloured clays, diluted and trailed over the surface through a quill; these colours were orange, white, and red, and glazed by means of lead ore beaten into dust and finely sifted and strewed over the surface. The vessels remained 24 hours in the kiln, and were sold principally to poor cratemen, who carried them at their backs all over the country for sale. The forms were dishes, tygs, or mugs with two or more handles for passing round a table, candlesticks, &c. The potter to whom Staffordshire owed great improvements in the manufacture of earthenware was John Philip Elers, from Holland, who, being a clever chemist, discovered the art of mixing the clays of the neighbourhood to great perfection. His imitations of the red ware of Japan, with leaves and other ornaments in relief, are well known. The various manufactories at Burslem, Bradwell, Shelton, Tunstall, and other places in "the potteries," and the gradual improvements in the composition and glazing of the ware, were adverted to in turn, illustrated by specimens which had been procured for the occasion, including the Staffordshire agate, marbled, tortoise-shell, cabbage-leaf tea services, &c., made by Wheildon; the moulded ware of Enoch Wood; the close imitations of Wedgwood's jasper made by Turner, Adams, Neale, and others. The family of Wedgwood was of long standing at Burslem, and many members of it were engaged in making pottery long before the birth of the great potter, Josiah Wedgwood, which took place in 1730. He was the youngest of 13 children, his father dying when he was only nine years old; his eldest brother succeeded him, and took Josiah as an apprentice in 1744. During his apprenticeship he was seized with a violent attack of small pox, which left its effects in his system and settled in his leg, and an accidental bruise resulted in the amputation of his leg in the 34th year of his age. In 1754 he went into partnership with Thomas Wheildon, and he remained at Fenton for five years, after which he returned to Burslem and commenced business on his own account. Here he set himself earnestly to work, improving day by day in everything he undertook, and became so successful that he was compelled to enlarge his works, and he engaged the services of his cousin, Thomas Wedgwood, who in a few years became his partner in the "useful branch," especially the Queen's ware; in 1768 he took into partnership

Thomas Bentley, to whom was entrusted the "ornamental branch," both departments being kept distinct as far as the interests of his partners were concerned. In 1769 he opened a very extensive manufactory, which he called Etruria, and his first productions were copies of Etruscan vases, for which he took out a patent. In 1773 he made a fine white terra cotta, proper for cameos, portraits, and bas reliefs. In 1776 the solid jasper ware was invented, in which Wedgwood largely employed sulphate of barytes, and for many years derived great profits from this, none of the workmen having any idea of the nature of the material upon which they were operating, until a letter containing a bill of parcels of a quantity of this article fell into the hands of a dishonest servant, who told the secret, and deprived the inventor of that particular source of emolument; for when the same article was made by those who employed inferior workmen, to whom they gave only one-fourth of the salary given by Wedgwood, the price became so reduced that he was unable to employ the exquisite modellers he had previously engaged. In 1780 his partner Bentley died, and the superintendence of the ornamental branch was given to Webber, a clever modeller, who, among other works, copied the celebrated Portland vase. Flaxman was engaged by Wedgwood and Bentley as early as 1775, and he continued furnishing them with designs and models up to the time of his departure for Rome in 1787, but after that he occasionally executed some models, and overlooked and gave finishing touches to the works of the Italian artists who were employed in copying subjects from the antique for Wedgwood at Rome. Josiah Wedgwood died on 3rd January, 1795. Some fine examples of Wedgwood's bas-reliefs in black basaltes and in jasper were exhibited. In conclusion, Mr. Chaffers remarked that the great improvements effected by Wedgwood may be best judged by a comparison with the works of the potters who immediately preceded him, many of which were on the table. Wedgwood not only in his "useful branch" displayed his aptitude for combining utility with neatness, and a certain degree of elegance, but in his "ornamental branch" he had a higher aim, which was to emulate the ancient potters of Greece, and in this he was ably assisted by his partner, Thomas Bentley. The lecturer referred his hearers who desired to be more fully informed upon the subject to the interesting work, "The Life and Works of Josiah Wedgwood," by Eliza Meteyard. The authoress had endeavoured to do all honour to his illustrious name, and with the materials she had gleaned from various sources (especially the manuscripts in Mr. Mayer's possession) had, with untiring energy and zeal, fulfilledthe task of a faithful biographer.

Twenty-second Ordinary Meeting.

Wednesday, May 15th, 1867; W. H. Dalton, Esq., in the Chair.

The following candidates were proposed for election as members of the Society:—

Armit, Lieut.-Col. Louis, R.E., Golden Cross Hotel, Charing-cross, S.W.
Lucas, Frederick, 26, Maddox-street, Regent-street, W.
Salvin, Anthony, 4, Adam-street, Adelphi, W.C.
Whitley, Nicholas, Truro, Cornwall.
Williams, Michael, 35, St. James's-place, St. James's-street, S.W.

The following candidate was balloted for, and duly elected a member of the Society:

Whichelo, George, 14, Burnley-road, Stockwell, S.

The Paper read was—

ON NEW MACHINERY FOR CUTTING, TUNNELLING, QUARRYING, AND FACING SLATE, STONE, AND MARBLES.

By W. Fothergill Cooke, Esq.

"Coctilibus muris cinxisse Semiramis urbem."
Semiramis is said to have surrounded the city with burnt-brick walls.

Such was the defensive material for fortifications in the days of Semiramis; and the grand old temples and palaces of Nineveh, thinly coated with richly sculptured slabs of limestone, or precious marbles over bricks (burnt or unburnt), stood forth with well-contrasted grandeur and apparent solidity. The Romans and the Lugdinenses of their day, conjointly reversed the practice; and whilst the Roman general fortified the city with stone ramparts, the London citizens raised their habitations in fiery red bricks.

Stone is scarce, whilst clay is still abundant in the precincts of London; and sea-borne coal cheaply converts the subsoil into the most handy of building materials. Not only is stone scarce, and expensive in the rough block, but the finished and ornamental working of it is most costly, and even a thin casing of stone adds from fifty to seventy-five per cent. to the architect's estimate for a frontage alone.

I trust this evening to introduce to my hearers some novelties in the machinery for cutting rock, and working stone for ornamental purposes, which may encourage our architects and builders to adopt stone, instead of London brick and Roman cement, in their future elevations, and thus open up a prospect of a better architectural future for at least our western streets and mansions.

Stone, of good building qualities and easily worked, is abundant in many parts of Great Britain; and the charges of carriage by canal, rail, and sea would not materially affect its use in the better class of buildings, if it could be worked more economically, and sent up in a quite, or nearly finished state from the quarry.

A class of stone rarely or never seen, I believe, in London buildings, but much used in the best buildings in North Wales and some parts of England, the tertiary limestone, is very durable and cheap, and takes an excellent face, almost approaching to a polish, under the new tool. Sandstones, Portland, Caen, and Bath stone, are all much softer and mostly less durable than limestone, but not more easily worked.

Machinery, which has been so widely applied to other trades, has hitherto done but little for masonry, though in this remark I confine myself to masonry proper, not including sculpturing by machinery. Except by the sand-saw, and occasionally by the circular toothed-saw, stone has hitherto been worked chiefly by hand. I wish here to remark that the harder stones, including the granites and granite-like rocks, cannot be operated upon by this machinery at all. This machinery, which I will now proceed to describe, depends chiefly for its efficacy on the peculiar forms of the cutting tools or movable teeth; firstly, in the application of them as attached to holders or sockets fixed in the edges of the blade, instead of the blade itself forming the cutting edge; and secondly, as applied to the circumference of cylinders for surfacing. The tools, or cutting-teeth, are, in consequence of their being movable in the sockets, easily replaced as required without any reduction of the diameter of the blade, which so soon renders the circular saw, when applied to the cutting of stone or slate, useless. These movable tools or teeth are capable of application to machinery for a variety of purposes, firstly, to the sawing of blocks and slabs of rock of considerable thickness, for building or other purposes; secondly, for facing the surface of squared-up stones in an ornamental manner; thirdly, for tunnelling, for undercutting stone, slate, or coal in situ, where the rock lies more or less on the incline, and also for the vertical cutting of the living rock almost as readily as a haycutter cuts hay out of a stack. These movable tools, held in movable sockets, are, as I have said, the distinctive features of this

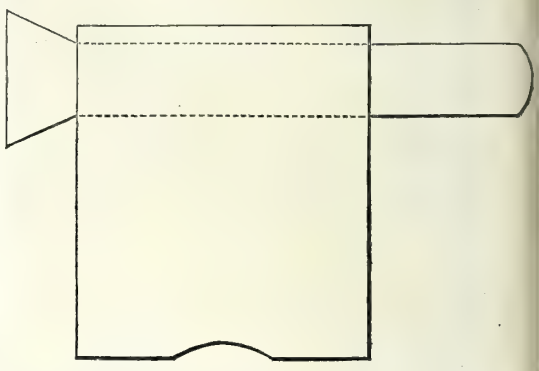
machinery, and they are exclusively the invention of Mr. George Hunter (now of Maentwrog, North Wales).

"Hunter's saws," with the improvements which have rendered them so effective for many purposes, are becoming well-known in the United Kingdom. They are extensively used in North Wales; and last autumn Mr. Hunter put up one at South Shields, for the Commissioners of the Tyne Navigation. The diameter of the blades in this saw is seven feet, and it carries two blades on the axle. It is employed to cut the limestone of the neighbourhood for the Harbour works. The performance of this saw gave such satisfaction that a second was speedily ordered, to carry two blades of thirteen feet diameter each. This gigantic machine is now finished, and will be speedily at work upon the same limestone. Its depth of cut is over five feet. As there is no reason why the thirteen feet saw should not work as easily as those of seven feet, the success of this machine will, I feel confident, attract the attention of engineers and contractors to the desirability of this means of squaring large stones for harbour and similar purposes, where size, economy, and time, are always of leading importance.

As it is known to many now present that my own name is united with Mr. Hunter's in several recent patents, I will observe that my share has chiefly consisted in extending the application of the movable tools and tool-holders (the real essence of his invention) to fresh and wider fields of usefulness, whilst the onus of adapting the machinery to each novel application, and in so doing producing an entirely new result, has fallen upon the inventive genius and mechanical skill of Mr. George Hunter.

Fig. 1 represents the movable cutting tool, now most in use, fixed in its holder or socket. It is a bolt made of the best rod steel; the head is forged into a cupped or trumpet form—turned, and then hardened. When in use it is simply slipped into its socket, which is also made of steel, and wedged tight by a piece of paper or a thin shaving of wood. When the edge is dulled or chipped the tool is turned in its socket so as to offer a fresh cutting margin: and, as it wears away chiefly on the advancing side, the tool will generally offer three, sometimes four fresh surfaces before it is worn out. These tools, according to the circumference of the saw blade, are from four to eight inches long, and the cutting head itself from half an inch to one and a quarter inch wide. The length of the bolt allows of

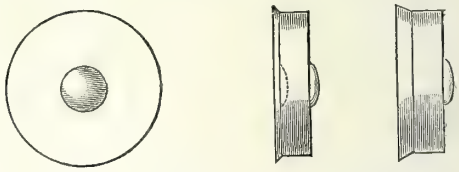
Fig. 1.



the tool being softened, again set up, turned, and hardened, until it is too short for further use.

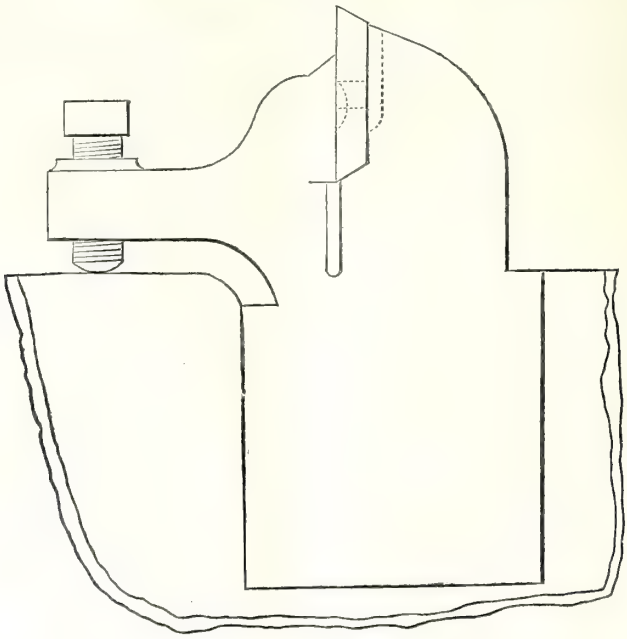
The stems of the sockets are of the same thickness as the blades that receive them, and are slipped into grooved openings in the margin of the blades, to which they are fitted with accuracy by machinery. As the

Fig. 2.



blades revolve slowly, the tools are usually replaced, or merely turned round in their sockets when necessary, without stopping the machine, and should thus be kept

Fig. 3.

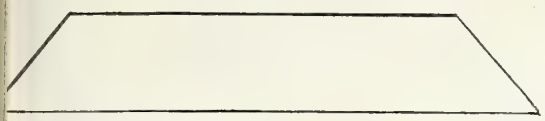


always in good cutting order. The cupping, shaping, and tempering of these tools require modification in each case, to adapt them to the texture of different kinds of stone. Limestone and sandstone, for example, cut away in large chips, whilst slate has to be scraped away, and the tool must be made to suit each case.

The next tool (see Fig. 2) to which I will direct your attention is formed by the double action of a punch. The first action cuts out a round disc from a plate of steel, like the punching of a boiler plate; the second action converts the disc into a tool, precisely similar to the head of the bolt-like tool just described, only ready cupped and sharpened, with a boss behind, to fit into a corresponding groove in the back of its holder, and with a hollow in front for a nipping bolt, or pinching screw, to grip it (see Fig. 3). These discs, so punched into the exact form required, only need tempering to be at once fit for use. The holder of the disc-tool grasps it between (as it were) its finger and thumb with perfect firmness, and as the cutting rim projects only very slightly beyond the holder, it offers very little leverage to the resistance of the stone, and never gets loose or displaced. Either of these forms of tools may frequently be used for the same object, but each has its specific application as well.

I must now introduce you to another form of tool (Fig. 4), equally simple in its character with the last, but peculiar

Fig. 4.



in its adaptation to a distinct purpose. It is formed out of a symmetrical, acute-angled trapezium, cut from a riband of steel, two or three sixteenths of an inch thick, according to the roughness of the work it has to do. To convert these slips of steel into the required form of tool, they are bent sharply on their middle, so as to bring the acute angles opposite to each other, but slightly turned out at their cutting angles.

These tools are cut from the ribands of steel without any waste, and if not left sufficiently sharp by the shears, a number of the flat slips are screwed up together in the vice, and sharpened by the file; they are then bent and hardened, and are fit for use.

The socket for this form of tool is extremely simple (Fig. 5); it is merely a hole into which the tool slips, and in which it is held by the spring of its own arms. The chief use of this tool will be the roughing down grindstones, and scarifying the rough surface of slate and stones, preparatory to the facing tool, and it is, perhaps, the best form of tool for under-cutting coal.

In addition to those already described, there are flat, concave, and other formed tools, all adapted to the holders, for giving ornamental and apparently hand-tooled surfaces to ashlers, quoins, sills, &c.; but as I shall have occasion presently to call further attention to them, when speaking of ornamental mouldings in machine-worked stone, I will not here dwell upon the subject.

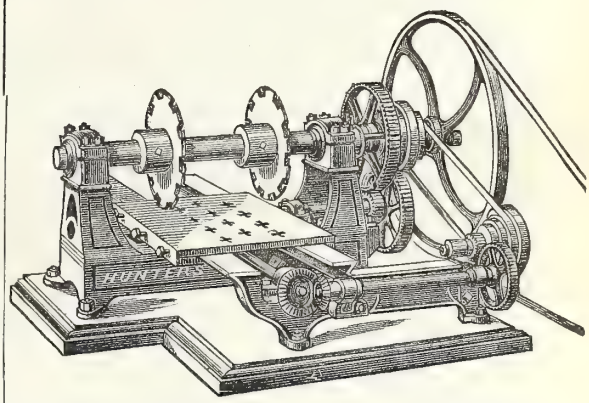
I now turn to the application of these simple, cheap, and effective weapons to various forms of machinery:—

First in order comes the "Hunter's saw."

The diagram attached (Fig 6) is so clear that it almost tells its own tale; it is taken from the small hand model upon the table. In the mechanism of the machine itself there is but little novelty, and it may be worked by any suitable power.

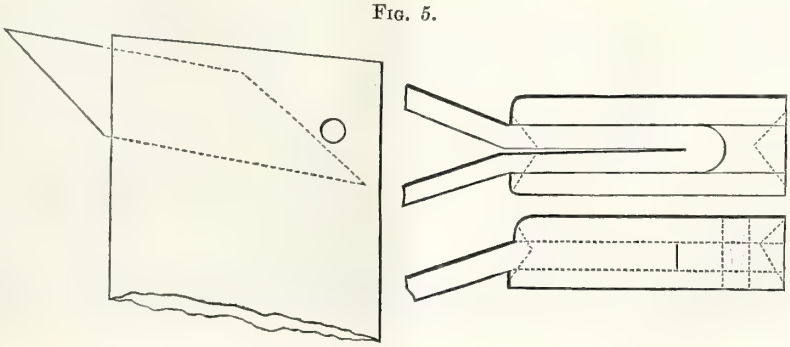
It consists of a table moving on V grooves, or on friction pulleys, to which the stone to be cut is fixed by cramps, or, when very massive and rough, as at Newcastle, by chains. The table is fed forward by a self-acting screw, and advances upon the cutting-blades at a speed of from three to six inches per minute; the speed varying with the work to be done and the nature of the stone. The cutting-blades, running from one to four in number, are fixed to collars, which traverse on an axle above the table, supported by uprights, and moved by a train of wheels in the usual manner. For adjusting the width, pinching screws in the collar of the cutters are slacked, and the blades are then pushed or worked by ratchet along the axle, and can thus be set apart to correspond with the width of any stone that the table can carry.

Fig. 6.



In Fig. 6, as well as in the foregoing description, the saw-blades are represented as working above the table, but they are not necessarily, or always so placed, except when the stone or slate to be cut into slabs or blocks is of variable widths, and the blades have to be moved on the axle to correspond therewith. When the blades are above the table the tools are made to cut up-

Fig. 5.



wards from below, by which the working of the machine is eased, as each tool slides smoothly at first into the groove formed by the preceding tool, and then cuts boldly out at the top of the slab in its own new path. But, when the blades are carried on an axle below the table, the cut must be from above downwards. If these arrangements are reversed, the tools will come *aplomb* on the stone with a jarring blow, and tend to drag it into the cutter, when the result may be the crumpling of the blade, or the stripping off of the tools from their holders.

Before leaving this machine I will state that, for cutting window-sills, door-posts, steps, coping-stones, and a host of other building materials, out of rough blocks of slate—which were formerly necessarily thrown away as useless, because there was no means of working them—we employ now three or four blades of four feet diameter, all cutting at the same time upon the same axle. These blocks, frequently twelve to sixteen inches thick, and weighing several tons, are simultaneously reduced to five thick slices, and immediately split up into the required thicknesses for planing, or tooling, as most suitable. An immense amount of paying work is thus turned out of rock, formerly all thrown away, and still accumulating by thousands of tons yearly on some of the giant and wasteful rubbish heaps of the Welsh slate quarries. At quarries in which I have a considerable interest there are now three, and will shortly be seven, saw-tables of large dimensions in busy and productive work—converting everything of value into slates, slabs, or building materials.

Under a recent improvement we use a succession of tables always advancing, on which the blocks are prepared before the saw is ready for them, which saves the time of running back the table, unloading, and preparing another block. Thus, so soon as the first cut is completed, the saw-blades are re-adjusted for the next block, the first table is brought on, and at once passes forward under a crane, where the block is re-adjusted for the next cuts, or, when finished, removed to be split up for the planes, and the table is either sent forward to the next saw with a fresh load, or lifted by the crane on to a line of rails parallel to the series of saws, and run back to commence its course again.

The next application of the movable cutting tools which I will describe differs but little in principle from the last, but is productive of very different results. The axle of the cutters is still above the table, but capable of being raised or lowered, as the cutting tools are in the ordinary engineer's plane. Instead of two or more blades fixed on their sliding collars, carrying an array of cutting tools on their peripheries, as in the saw, the axle itself, or a removable cylinder slipped on, or bolted in halves to the axle, receives the tools.

The object of the machine now under consideration is to give a finished surface to building or other stone of a more or less ornamental character; and breadth not depth has to be cut. The tools are fixed in holders, placed spirally round the axle or cylinder, so that a divided and regular pressure may come upon the face of the stone at intervals of two or three inches, always nearly uniform, but ever passing spirally from right to left. In the specimens of ashler shown, the tools formed one spiral, each fourth tool cutting at the same time, and six tools were entering into the cut as other six were leaving. A double spiral, in which the tools followed each other more closely in their cut, would have given more uniformity of strain, but could hardly have produced a more perfect piece of work. The fluting here produced may be varied without limit, or, the margin work cut by the flatting tool may be carried over the whole surface. By the introduction of a second cylinder, the beginning and end of each stone will receive a border across the stone corresponding to the long margin of whatever pattern it may be. For fluting or similar work the punched tools have a great advantage, whether of the disc or flat-faced form, as they are always of exactly the same diameter, and produce uniform work. The marginal tool may cut off a chamfer if required.

Anything that parallel working tools on a revolving axle can execute, will be done readily by this machine, and on a larger cylinder tools of a different shape may work along the same line so as to vary a running figure, by alternate markings. In fact, the outline of work thus produced seems unlimited, and ornamental figures, that this machinery cannot complete, may yet be prepared by it in outline ready for the sculptor's hand. Take the instance of a Gothic church window. The perpendiculars would be easily cut out in any running pattern, on a straight moving table, by a series of tools corresponding in their forms to the required surface. These tools would be fixed on a cylinder cast more or less in reverse of the same outline; but the same lines round the arch would render it necessary that the table carrying the stone should travel along rails or grooves, bent accurately to the curvilinear line required for each particular arch.

These hints will readily expand themselves in the mind of every practical man. Many figures more difficult than the above have already been considered, and the means of execution planned.

The roughing tool before described can be made to imitate the marks of a pickaxe in rustic stone work, with the usually chiseled work around it.

The table for carrying the stones to be faced in continuous lines has hitherto been supposed to be the same as that used for sawing or planing ordinary slabs, but when quoin or other stones of irregular dimensions and great size have to be treated, a distinct table, with a skeleton cradle, either movable or fixed, is necessary to receive the blocks, and offer the upper surface of the stone horizontally to the facing cylinder. The irregular-shaped block thus placed is fixed by pinching-screws or wedges, and the depth of cut is regulated by the lifting-tool gear as in a common plane.

Some of the patterns of flat tooling by these machines can be made to imitate chisel-work so closely as to be distinguishable alone by the finer finish given by the machine. The shortness and sharpness of the tool-cut are regulated by the diameter of the axle, the number of cutters, and the rate of feed. The finer kinds of limestones, including especially those of the Isle of Anglesea, receive almost a polish from the cutters. These machines will be of moderate weight except when required for the facing of massive blocks, and a very small power works them, so that they could be sent about the country to prepare the stones for a building on the spot, where an equivalent complement of masons could only be obtained by collecting them from great distances.

I will now describe the machines for cutting stone, &c., out of the living rock in the quarry itself. The principle here is, I believe, new. The cutting tools, instead of being placed in a single row around the rim of a thin blade, are fixed in rows of twos and threes alternately across the margin of a wheel-like disc, so as to clear away a wider space. The outer portion of this wheel-like disc is a ring of fine malleable cast-iron armed on the out-side with tools, and carrying a cog-wheel within. Not to enter into small details of fittings, this cogged wheel is made to revolve on a broad metal plate as its axle. This broad plate is of great strength, and forms four-fifths of the diameter of the entire cutter, and can be firmly bolted to the machinery frame by any part of its surface nearest to the cogged wheel which carries the tools, and the latter so held is made to revolve by a pinion around it. This arrangement allows eccentrically-held cutters to penetrate the rock to a depth exceeding the semi-diameter of the disc. In the circular saw with a central axle, the blade can only penetrate to so much of its semi-diameter as is clear of the axle and collar, and great force would be required to hold such a cutter up to its work in the rock, but in the machine now

before us, the cutter-wheel is buried in the cut up to the point at which it is held, and practically allows of a cutter of 3 ft. 4in. diameter burying itself to the depth of 2 ft. 3 in., and as the cutter cuts out at a chord smaller than the diameter, the tendency of the outcoming tools is to draw the cutter into the cut, instead of forcing it out. A machine of this kind, cutting horizontally, works with great freedom, and advances rapidly through slate rock upon which it is employed. But when a cutting wheel on this principle is applied to make a vertical cut, a still smaller surface of the broad-axle plate is occupied by the holder, as it can in that position be grasped on both sides, and the axle, carrying the pinion, can be passed through the wheel and supported upon double bearings.

The machinery, including the cutter-wheel, for vertical cutting, is fixed on a carriage running upon rails, and worked by a wire rope. The cutter-wheel is gradually brought down from its travelling position by a worm and worm-wheel to press upon the rock till it buries itself up to the holder, when it is fed forward by a self-working screw, attached by chain and swivel to some point in advance, or by winding directly upon a chain.

A tolerable level having been first obtained on the face of the quarry, and a line of rails pinned down in the direction of the cut to be made across the greatest length, the machine commences its advance, leaving a deep groove behind it two or three inches wide, and two, three, or four feet deep. A series of parallel cuts may afterwards be made, or two disc cutters on the same carriage frame may be advantageously used to make two cuts at a time. An opening at the commencement of the first cut end must then be got out by blasting or otherwise, but afterwards, if the rock has any sort of cleavage, or layering, it may be wedged up from below. The rock from between the first two cuts being thus removed, the vertical cutter may readily be applied to cross-cut the longitudinal grooves into squared blocks, to be removed by under wedging, or partial undercutting, when there is not a favourable cleavage. The principle of the "under-cutting" machine is precisely the same as that of the vertical cutter. The cutter plate, however, has to be held horizontally by one side only. The cutter lies under the frame that carries it, and is advanced into its cut by worm-screw and worm-wheel as already described. When buried up to its holder in the rock, the cutter traverses along a slide frame twelve feet long; at the end of the twelve feet the slide and its carriage frame are pushed forward on the wheels for another length, and there fixed so as to leave the cutter free in its previous cut; it again proceeds on its journey, fed forward by its self-feeding screw, and so on to the end of the opening. The photographs of this machine exhibit all the details of its construction, which cannot be popularly explained without illustrations. The exposed parts of all these machines are very strong, and although shattered pieces of rock coming down upon the cutter-disc may momentarily impede its working, no injury to the machinery follows. The masses of stone cannot crush the disc, and the power employed in working the machine is not sufficient to break the wheel-work.

There are other applications of these movable cutters which I would gladly have introduced to the attention of the Society this evening, especially the coal-cutter, but the time allotted is too short for my venturing upon them on the present occasion. There are some photographs, however, which display the formidable character of the tunnelling machines. One form includes in its construction two parallel borers, cutting two tunnels each 5 ft. 4 in. in diameter, side by side, and freeing two cores weighing more than two tons each at every cut. The slab of slate, still marked at its ends by the cutting tools, indicates the size of the pieces of slate that may be won by it. From one core, and that one the first ever cut by that machine, 23 slabs of more than one ton in weight were made, besides a considerable number of slates. Its rate of progress in cutting is eight inches per hour, and the depth of cut allowed by the cutting-blades is twenty-one inches forward. This machine has penetrated many yards into the solid slate bed, and is destined, I fully believe, to revolutionise the present system of quarrying that valuable material.

Other photographs represent another form of the tunneller, which is now being erected in a quarry of the Ffestiniog Valley. It will cut a single tunnel six feet nine inches in diameter, and penetrate twenty-eight inches at each cut. The principle explained in the "under-cutting" machine is employed here, only the solid central holder, for the axle-plate, is here open in the centre as a ring, round which the cog-toothed cutter-ring revolves; and the latter, instead of carrying the movable tools on its periphery, in the same plane, carries three segment blades of steel, projecting forward, at the extremity of which a series of cutting tools are fixed, as in the saw-blades. The carriage of this machine is fixed in the tunnel immovably by bolt-screws, and the massive working parts gradually screw themselves forward as the cutters penetrate the rock. The open passage is preserved through the centre of the ring-frame and ring-cutter, to the front of the work, even whilst the machine is in action; owing to this, the core, after cleaving up, is more readily removed than from the double tunnelling machine. This machine will excavate more than five tons at a cut.

A high authority in engineering has lately condemned this principle of "planing" out a rim round a core as a mistake. I hope before the end of this month to prove, by a second marvellous success with a second machine, that practice is better than theory.

Five feet to 6 feet 9 inches will be no trifling advance in a second tunnelling machine; but a much larger diameter for mere tunnel driving will only facilitate its working, as it will admit of more space for strength. At all events, this machine admits of the greatest facility for replacing the tools, if blunted or worn by encountering hard matter in the rock. The feeding screw is simply run back, and the tools are examined and replaced without removing the framework from its fixed position. Generally the tools retain their sharpness throughout the cut. It must be remembered that these machines were made expressly for slate rock tunnelling, and have not yet been tried on sandstone or limestone rock for tunnelling purposes, which may offer fresh difficulties, only, I hope, to be mastered, and the usual means, perseverance and resolution, never fail us in this country.

The following are the dimensions and weights of parts of the great circular saw with thirteen-foot blades, now being erected near Newcastle for the Tyne Navigation Commissioners, by Mr. George Hunter:—Shaft, 15½ inches diameter; weight, 3 tons; driving-wheel, 3 tons; standards, 3 tons each; saw-blades with collars, 3 tons 2 cwt.; height above floor, 17 feet; cut, 5 feet 6 inches; width of cut, 1¾ inches; speed of tools, 18 feet per minute; feed of table for cut, 3 inches forward per minute; width between standards, 14 feet.

DISCUSSION.

Mr. BOTLY said they were very much indebted to Mr. Cooke for the very excellent paper to which they had listened, for to their Society anything which tended to economise labour and material must always be interesting. He had the pleasure of making a tour in North Wales in September last, when he had an opportunity of inspecting several of the slate quarries there. Some of these appeared, in his opinion, to be worked in a very slovenly manner. One thing he particularly noticed, which had been mentioned by Mr. Cooke, viz., the enormous waste of slate, especially in blasting. Large masses were wasted by the system of quarrying there adopted, and he apprehended, from the description of the machine, that a great saving might be made by its use.

Mr. R. G. LECKY had much pleasure in bearing his testimony to the value of the machines, having recently

seen one at work. There were many points in it much to be admired, especially the facility for sharpening the tools, and the power of the saws to cut deeper than their semi-diameter, which was a great fault with common saws. He was able to speak to that point, because about 15 or 16 years ago he had helped to plan, construct, and erect, what he believed was the largest slate saw ever made up to that time. It was for the Valentia quarries, and was capable of cutting nine inches of Valentia slate, which was pretty hard. Working with two 3 ft. 6 in. saws on one axle, they were able to cut nine-inch slabs at the rate of about five feet an hour, and this was considered pretty good work. He thought, therefore, that Mr. Cooke had spoken a little too depreciatingly of the working of toothed saws. These saws certainly lasted a very long time, for one pair had been at work for six months or more, and only required sharpening once a day. The blades were ¼ inch thick, and there was one-eighth set on each side, so that the breadth of the cut was half an inch. It was much easier to work these two saws than to work a single-bladed hand-saw. He believed these saws were still at work at Valentia. Hunter's saw, however, was a most efficient machine, and he was very much pleased with it.

Mr. C. F. Varley said that about two years ago he paid a visit to the neighbourhood which Mr. Cooke had described, and he had spent a considerable time in the quarries known as Lord Palmerston's, which he believed yielded the best slates to be found in that part of the world. The first thing which struck him was the mountains—not merely hills—of waste. It was something prodigious; in fact, he believed he was correct in saying that only about one-ninth of the slate got out of the quarry was ever brought into the market in the form of slabs or roofing slates, and that under the most favourable circumstances, when they had obtained large and sound blocks, they never succeeded in making more than one-fourth of the material so extracted available for commercial purposes. The process of tunnelling, which Mr. Cooke had particularly alluded to, seemed a very important one. It was necessary to form tunnels through the slate to get from section to section, and as in so doing they undercut the mountain, it was requisite to leave strong pillars to support the superincumbent portion, and all this had to be done before getting at the slate. It was therefore evident that if this tunnel took such an enormous time to cut—Mr. Cooke had mentioned ten yards a month—there must be a large amount of capital lying idle in such a quarry for a considerable time before any returns were made. Anything, therefore, which would quicken these preliminary operations must be very valuable, and he understood from Mr. Cooke that the tunnelling machine would do the work three-and-a-half or four times as quickly as it could be done by the old method. The combination of the circular cutter and the under cutter, by which pieces of slate were brought out ready for immediate working, seemed also very valuable, and he had been informed that in this way rather more than one-half of the whole amount of slate taken from the quarry had been actually rendered available for the market. That alone showed the immense value of the machines which Messrs. Hunter and Cooke had already brought into successful operation. The photographs which were exhibited showed that several little difficulties which had presented themselves when he was in the neighbourhood had since been mastered, and he saw no reason why the machines should not meet with all the success which had been hoped for them, especially since the cutters could be made in so simple a manner, so rapidly, and at so trifling a cost. These little circular discs were nearly the only parts of the machine which underwent any serious wear and tear, and these were stamped out so quickly that the only parts of the machine likely to wear—the teeth of the saw—were rendered the cheapest to construct, and not only this, but they were so simply and easily taken out and replaced that it took only about ten seconds to remove a damaged one and substitute a new one, the cost being, he should imagine, a very small fraction of a penny. All this, too, could be done without withdrawing the machine from its work. That he considered one of the greatest improvements. The application of the cutting machinery to the working of the stone seemed, however, to his mind, even more important than that which he had referred to, the mere cutting out of the plate, as it superseded the necessity for the enormous amount of hand-labour now employed in cutting and dressing stone. There was another point of view also from which it seemed to him that the invention ought to receive the especial approval of the Society. For many years, especially under the presidency of the Prince Consort, great attention had been paid to improvements in buildings for the poorer classes, and also to familiarising the public eye with articles of artistic design. One of the specimens on the table, to which Mr. Cooke had not drawn attention, was a piece of a ridge-tile, or stone, and in that it would be seen that, simply by one tooth of the machine being placed rather more prominent than the others, an effect very similar to what was called engine-turning had been produced, an effect which could not be produced by hand except at an immense cost. In the same way, it was evident that, by slightly varying the position of the tools, almost any design or moulding in stone might be produced. He believed that Mr. Cooke had done for stone that which was done many years ago for wood, and that material which before was of small value, but of costly manufacture, was now easy to be worked, and would, therefore, be produced in great abundance and at low cost; so that stone would begin to take the place of brick in very many instances.

Mr. Cooke, in reply to the questions and observations which had been addressed to him, said he feared the great waste from blasting would never be diminished in some of the great quarries. The floors were not so deep, however, as had been imagined; the deepest, with very few exceptions, were about 60 feet. In one or two instances, perhaps, the depth might be 90 feet. The practice which had been adopted there for some time was to bore a hole 14 or 15 feet in depth and 2 inches or 2½ inches in diameter, and charge it with powder, explosive glycerine, or cotton, and so bring down an enormous mass of slate, which, perhaps, would take three months in removing. He had seen, at Mr. Assheton Smith's quarry, a mass of slate which had not been entirely removed at a second visit, four months later. With such a quantity falling such a height, of course an immense amount was damaged, and not more than one-ninth, or sometimes a tenth, was fit for the market. He believed the proprietors would do well to introduce these machines, and thus effect a great saving. They had sometimes sent him pieces to cut, and a short time since he received a block of about four tons, which he returned in about half-an-hour, cut into fine slabs. Nothing could have been made of it without the machine, as some parts were very hard, and there was no good cleavage. He was afraid, however, that the wasteful system would continue for some time in the large quarries, where the owners, being wealthy men, looked for a large and rapid return, although such a mode of procedure must tend to exhaust the material; and he believed that one quarry at Penrhyn was already causing the proprietor some anxiety. He had been much interested in hearing from Mr. Lecky of the Valentia saw, which was new to him, or he should certainly have referred to it in the paper. He would like to know the speed at which it worked. The ordinary speed of their small saws was 120 ft. to 130 ft. a minute.

Mr. Lecky said the Valentia saw was driven at a speed of nine revolutions a minute, or about 108 ft.

Mr. Cooke said that their machines worked at only 45 ft. per minute. He believed the Valentia stone was very valuable, but that it was not a slate, and had no cleavage, being only valuable for slabs, and not for roofing slates.

Mr. Lecky said the stone was a true slate, and had a decided cleavage, though the softer portions would only cleave into very thick roofing-slates. The slabs were cut with hand-saws.

Mr. Cooke said that appeared to be a slate which wore the saws very little, for at the Ffestiniog quarries he had seen a saw removed twice in a day to be sharpened, and had known one worn out in the course of a fortnight. The work done by the Valentia saws was very good, and although there would be more waste, the comparative cost of the machinery at starting would, probably, in that instance, be in favour of the saws. He considered the small disc tool a perfect masterpiece, and the cost of each would certainly be a small fraction of a farthing. The ornamental work to which Mr. Varley had called attention arose from an accident; one of the tools being rather larger than the others, every time it came round it made one of those curves. Of course no one could see that without seeing that the same thing might be turned to advantage, and there was no doubt that the tools could be so arranged as to produce on the stone every effect of engine turning.

Mr. Blackie observed that the cost of the machines had not been stated, or the cost of erecting them, and what was the percentage of wear and tear, which, he imagined, must be considerable. He should also like to know what power was used to drive them, and the amount of horse-power required for a large machine.

Mr. Cooke said that, in the case of one of the machines which had been in operation two or three years, it had not yet shown any symptoms of wear and tear; it was difficult to form a calculation, but the part which seemed to wear most was the nut which worked the feed-screw; the dirt got in there and wore away the brass. The cost of the machines varied from £100 to £1,500; those were the two limits.

Mr. Blackie suggested that if cups were applied over the bearings and parts where dust was likely to fall, it would save wear, and remarked that no information was given as to the temper of the tools, and whether water or any other liquid was used in cutting the stone. It appeared to him that, whatever might be the temper of the tools, if they were worked dry, the friction and consequent heat would be so great as very quickly to destroy them.

Mr. Cooke said the machines worked so slowly that unless when cutting something particularly hard, like quartz or iron pyrites, the tools did not heat in the slightest degree. On one occasion, in cutting through some iron pyrites, he had found the tools not only hot but actually melting. Such cases were very exceptional, and must be dealt with when they occurred. With the circular form of tool, it was easily turned round with the finger as it came up, so as to present a fresh edge, and each tool gave them three cuts before it was worn out, and the largest of these tools would not cost certainly more than a farthing. There was a great difference of opinion amongst the workmen in Wales as to the merits of dry or wet cutting; in some quarries, where there were a great many circular saws at work, the men liked to use water, and in others they did not. In his (Mr. Cooke's) quarries they invariably used water in tunnelling, both to keep the tools cool and to wash out the *débris*. They worked the double-tunnelling machine with a small turbine, and some of the water, before it reached the turbine, was sent through a tube into the cutting, so that the tools were kept quite cool, and he had seen them go in for a second cut without turning, and that in bad slate, where there was a good deal of iron pyrites. With regard to the temper, he had already mentioned that it varied according to the stone to be cut. They did not send slate tools to Newcastle to cut limestone; a very inferior tool would do for that work. Nothing was worse to cut than sandstone or slate. The sandstone yielded too soon and ground the tool, and the slate also would always grind it. It would take a considerable time to grind the hard edge of the tool off, but when that was gone it was soon finished. Only the day before a mason had been looking at the various specimens of work on the table, and he at once observed that a different tool would be required for each. Marble would very soon destroy the edge of a tool if used dry, but if abundance of water were used nothing cut more easily, and a fine polish was left; it was like turning brass with oil, or iron with water, if they were turned dry the tool would very soon be spoiled.

Mr. Blackie suggested that the powdered stone which resulted from the cutting would be valuable for mixing with lime, in parts of the country where sand was not easily obtainable.

Mr. Cooke said this was a very good suggestion.

The Chairman then moved that a cordial vote of thanks be given to Mr. Cooke for the paper which he had brought before them. The machinery he had described seemed likely to prevent the waste of material of considerable value, and was certainly most ingenious.

The vote of thanks was then passed.

Mr. Cooke illustrated the action of his machinery by a working model, and a large number of specimens, showing the effect of the various tools described in his paper.

THE ROYAL COMMISSION ON RAILWAYS.

The Royal commissioners on railways have at length made their report, which sums up in great detail the results arrived at from the mass of evidence adduced before the commission, and gives judgment against the proposition that the railway system should be taken under the control of the state. The general conclusion of the commissioners is, in short, that no comprehensive plan shall be undertaken, and that the dealing with the railway system shall be confined to private-bill legislation and in the management by companies. The report says:—

"We are of opinion that it is inexpedient at present to subvert the policy which has hitherto been adopted of leaving the construction and management of railways to the free enterprise of the people, under such conditions as parliament may think fit to impose for the general welfare of the public.

"We consider that there is not sufficient reason for excepting Ireland from this general conclusion; but, as it has always been the established policy to assist railways and other public works in Ireland, we recommend that, when parliament thinks fit to make advances to Irish railway companies, the money should be lent for a fixed period of considerable length, so as to enable the company to develop its resources before it is called on for repayment. We are, however, of opinion, that advances should not be made to the Irish railway companies as a condition of reducing their rates and fares; but that, as the railway companies have the best opportunities of judging whether rates can be reduced so as to be recuperative within a reasonable time, they should be left to carry out such experiments at their own risk.

"We recommend that parliament should relieve itself from all interference with the incorporation and the financial affairs of railway companies, leaving such matters to be dealt with under the Joint-stock Companies Act, and should limit its own action to regulating the construction of the line and the relations between the public and joint-stock companies so incorporated, requiring such guarantee as may be necessary for the purpose of securing the due performance of the conditions upon the faith of which the parliamentary powers of the company have been granted.

"We do not consider that it would be expedient, even if it were practicable, to adopt any legislation which would abolish the freedom railway companies enjoy of charging what sum they deem expedient within their maximum rates, when properly defined, limited as that

freedom is by the conditions of the Traffic Act; but we are of opinion that railway companies should be required to give a reasonable notice of their intention to raise their rates of charge.

"We are unable to see any method of ensuring punctuality in passenger trains by means of legislative enactments, except that proposed by the committee of the House of Commons in 1858—viz., that punctuality should be guaranteed, and that passengers injured by delay should be enabled to recover summarily a fixed sum; but we have already referred to the objections to this proposal.

"We are of opinion that railway companies should be bound, under adequate penalties, to give at least a week's notice of any alterations of time of their regular passenger trains.

"We do not consider that any direct legislative enactments would cause greater economy in the working of railways; but we are of opinion that, with the object of affording a more accurate view of the operations of the railway companies, and of making any undue extravagance apparent, and thus stimulating economy, it is desirable that the several railway companies should render their accounts to the Board of Trade, showing receipts from traffic and the detailed cost of working the line, upon a uniform plan; and that, after consultation with the railway companies, the Board of Trade should not only prescribe the form of such returns and accounts, but lay down the basis on which they are to be computed.

"Parliament has relied, for the safe working of railways, upon the efficiency of the common law and of Lord Campbell's Act, which give persons injured, and near relatives of persons killed, a right to compensation. We consider that this course has been more conducive to the protection of the public than if the Board had been empowered to interfere in the detailed arrangements for working the traffic."

Fine Arts.

Exhibition in Paris of the Products of the Public Schools of Art.—The Minister of Public Instruction has determined upon establishing a general exhibition of works of art of all kinds produced in the Art Schools of the State, and has devoted the terrace of his mansion to the purpose. Three galleries, which will be finished in a few days, will be appropriated as follows:—In one will be specimens of modelling, architectural works, casts in plaster, plans, linear drawings, ornaments, stereotomic models, and mathematical and philosophical instruments. The central gallery will be devoted to drawings, engravings, lithographs, and photography; and in the centre will be an exhibition of needle-work, lace making, application, embroidery, and other works produced by the pupils of the female schools. The third gallery is intended for a different purpose, namely, the exhibition of objects of value and interest, brought from Mexico by the Scientific Mission, with a systematic collection of ores and minerals made in Mexico, and a number of statuettes of divinities of past times, and other works of art.

Manufactures.

Centrifugal Gun.—Dr. Steinheil, Professor of Natural Philosophy at the University of Munich, well known in the scientific world for having laid down an electric telegraph at a very early date, has invented a gun, which is thus described by one of the *Times*' correspondents:—"Figure to yourself an iron plate of a circular shape, sunk in the middle. This cavity is filled with balls, which, on the plate being set in motion, are propelled along a groove radiating to the edge, where they are received into one or several barrels made to point to the object aimed at. The centrifugal force with which they leave the disc, being on mathematical principles 12 times as great as the celerity attained by the revolving edge, exceeds, we are confidently assured, anything yet achieved by rifles. The disc, which has a close-fitting covering and several other addenda, to facilitate the surer aim, is set in motion by a wheel, worked either by a single man, or, in the case of heavier balls, by a steam-engine. This novel catapult—which, it may have struck the reader, is constructed upon the same principle of centrifugal force active in man's oldest projectile, the sling—may, it is asserted, be made to hurl from 60 to several hundred balls towards one point in a minute. The first specimen of his gun was submitted by Dr. Steinheil to the inspection of the Bavarian War-office as early as 1832. Sixteen years later he produced another and heavier machine of the same sort, throwing grape, and requiring a steam-engine to work it. In both instances the Bavarian War-office passed a favourable opinion upon the cannon, but did not think it adapted for other purposes than the defence of fortresses and ships. The secret of the invention then transpiring, the machine appears to have been imitated in several quarters, and also got to America, whence it reached the Emperor Napoleon. In Germany the Brothers Eberhardt, at Ulm, have just turned out an offensive weapon, operating, it would seem, on the same principle, but having four barrels instead of one, as is the case with the French "infantry cannon." Each barrel is stated to be capable of 60 discharges in a minute. Should all this be confirmed by the experiments sure to be made in more than one place, it is, perhaps, not too sanguine to entertain a hope that war will become more and more rare, owing to the dreadful perfection of the instruments intended to further it."

Commerce.

Progress of French Commerce.—A work has been published by M. Devinck, formerly President of the Tribunal of Commerce, at Paris, containing an inquiry into the progress of commerce and manufactures in France. From this it appears that in 1851 the commercial and manufacturing situation of France was as follows:—Imports, 1,094 million francs; exports, 1,520 millions, making a total of 2,614 million francs. In 1865 the imports were 3,528 millions, and the exports 4,087 millions, or, in all, 7,615. In 1866, for the first eleven months only (the general balance not having been yet established) there is a total of about 8,500 francs, being an increase in fifteen years of nearly 200 per cent. In 1851 the number of French vessels which entered or left the French ports was 34,436. In 1865 the figures rose to 51,156, showing for maritime commerce alone a progress of about 50 per cent. In 1851 the network of railways measured 3,500 kilometers (five-eighths of a mile each), but at the end of the year 1866 it showed a length of 14,000 kilometers actually at work. The concessions form a much larger amount—more, in fact, than 21,000 kilometers. In 1851 the telegraphic service possessed 100 stations for 3,000 kilometers, and transmitted 10,000 despatches. In 1866 it was in operation for a distance of 31,500 kilometers, possessed 2,100 stations, and transmitted 2,500,000 despatches. The charge has been reduced by 70 per cent. since 1851. The number of letters carried in the earlier period was 65,000,000, whereas in 1865 it had risen to 329,000,000. The postage has been diminished on an average one-fifth, and the conveyance has become four times more rapid. In 1851 the amount of discounts at the Bank of France was 1,241 millions, whereas in 1866 it was 6,574 millions. During the same period the produce of the coal-basins has been increased two-fold, and that of the manufactures in cast and wrought

iron tripled. The state has executed great works for improving the navigation of canals and rivers. By buying up the tolls paid to companies the tariffs have everywhere been either suppressed or lowered. In the year 1851 the indirect taxes and those on consumption produced a sum of 738,242,000 frs.; in 1852, 804,334,000 francs; and 1866, 1,282,268,000 francs. At the same time that the consumption has been so prodigiously developed to the great profit of the Treasury, the public savings have been most considerable. In fifteen years France has furnished capital, the amount of which may be set down at 20,000 millions, which has been either invested in loans contracted by different governments, or employed in the establishment of railways, formation of powerful companies, or in great works of public utility, and in material improvements of every kind.

Colonies.

Intercolonial Customs Duties. — A Queensland paper, referring to the impediments caused to trade by the existence of border custom-houses, says:— "There ought to be no necessity for any thing of the sort between the different Australian colonies, and it may be avoided by a mutual recognition by the various governments of what is just and equitable to each other. The increase of traffic across the different borders as population increases will eventually bring about the first step towards federation in the establishment of one uniform system of customs duties, the proceeds being equitably divided between the colonies. In the meantime it is the duty of each of them to make such temporary arrangements as shall give substantial justice without interfering with the freedom of trade."

Publications Issued.

Modern Marine Engineering applied to Paddle and Screw Propulsion. By N. P. Burgh, Engineer. (*E. and F. H. Spon.*) This work treats of ordinary, compound, and expansive engines, adapted for paddle, single, and twin screw propulsion; of surface and injection condensers; of expansion, equilibrium, slide and other valves; of link motion, starting gear, thrust blocks, paddle wheels, screw propellers, ordinary and superheating high and low boilers, and other subjects connected with marine engineering. It contains 36 coloured plates, 259 practical illustrations, and 403 pages of letterpress, the whole being an exposition of the present practices of the following leading firms:—Messrs. J. Penn and Son, Messrs. Maudslay, Sons, and Field, Messrs. James Watt and Co., Messrs. J. and G. Rennie, Messrs. R. Napier and Sons, Messrs. J. and W. Dudgeon, Messrs. Ravenhill and Hodgson, Messrs. Humphreys and Tennant, Mr. J. F. Spencer, and Messrs. Forrester and Co. Mr. Burgh is also author of "A Treatise on Sugar Machinery," "Practical Illustrations of Land and Marine Engines," "A Pocket Book of Practical Rules for Designing Land and Marine Engines, Boilers, &c.," "The Slide Valve Practically Considered," "The Manufacture of Sugar, and the Machinery Employed for Home and Colonial Purposes," &c.

Notes.

Post-office Alterations.—The Postmaster-General has issued announcements of several alterations with respect to foreign mails. One is to the effect that the limit in weight of books and patterns sent to the East Indies has been raised from 3lbs. to 5lbs. Another states that, as the Peninsular and Oriental Steam Navigation Company are about to withdraw the extra steam vessels which they have appointed experimentally to sail from Suez to Bombay simultaneously with the packets which leave Suez about the 5th and 20th of each month for Madras and Calcutta, the last extra mail from London to Bombay will be forwarded from London on the 20th May, *viâ* Southampton, and on the 27th May, *viâ* Marseilles; and thence forward, and until further notice, correspondence addressed to the East Indies will be despatched as it was despatched previous to January 20th last. It is also stated that the postal commission has been re-established between Vienna and Constantinople, by way of the Danube and the Black Sea. Advantage will be taken of a line of railway which has just been opened between Rutschuk and Varna. Mails for conveyance by this route are despatched from Vienna on Mondays and Fridays, and letters from the United Kingdom will be in time for the mail of Monday if despatched from London *viâ* Ostend, on the morning of the previous Saturday, and for the mail of Friday if despatched from London on the morning of the previous Wednessday. Letters from Constantinople, which the senders may desire to forward by this route, must be specially addressed "*viâ* Ostend. The postage will be 9d. for a letter not exceeding half-an-ounce in weight when pre-paid, and 11d. if sent unpaid.

Literary Congress in Paris.—La Société des Gens de Lettres has decided to hold an international congress during the present exhibition season, in order to give literature all the advantage that may be derived from the presence of foreign writers in Paris; these will be invited to attend the meetings and debates of the society, the dates of which will shortly be published. The society considers that now that barriers are disappearing, and distances are almost effaced by mechanical means, literary questions increase in importance and interest to all the world instead of merely to the nations in which they arise. Travelling, translation, and the increasing study of foreign languages are tending to make literary productions universal property, which all are called to watch over and diffuse. Lastly, the hope is expressed that such a congress may lead to the establishment, in other countries, of societies of men of letters similar to those which render valuable service to French writers.

Concentrated Milk.—The *Estafette* of Lausanne says that the business in concentrated milk at Cham, near Zoug, promises to become of importance. The method employed is thus described: the milk is placed in an apparatus where the aqueous portion is withdrawn by a kind of air pump; a certain quantity of sugar is then added, and when the milk is of the consistency of thick honey, it is placed in tin boxes and hermetically sealed. One litre of the concentrated milk is said to be equal to more than four litres of fresh milk.

A Glass House.—A large building, five stories high, to be used as a factory, is being erected in the Rue de Tardy, at Saint Etienne, which attracts great attention. With the exception of the back wall, the whole façade is of glass; in fact, the three sides consist of iron frames supported by stone columns, and filled in with sheets of thick glass.

To Correspondents.

Errata.—In the last number of the *Journal*, p. 403, col. 2, last line, for "59," read "65;" p. 404, col. 1, line 2, for "56," read "69;" col. 2, line 18, for "400," read "360;" p. 405, col. 2, line 58, for "74," read "745;" at p. 406, col. 2, line 62, for "quantity," read "quality."

MEETINGS FOR THE ENSUING WEEK.

Mon..... Society of Arts, 8. Cantor Lecture. Mr. Chaffers, "On Pottery and Porcelain."
R. United Service Inst., 8½. Commander Pownall W. Pellew, R.N., "Fleet Manœuvering."
British Architects, 8.
Asiatic, 3. Annual Meeting.

TUES ...Civil Engineers, 8. 1. Renewed discussion upon Mr. Chance's paper, "On Optical Apparatus used in Lighthouses." 2. Mr. Edward Byrne, "Experiments on the Removal of Organic and Inorganic Substances in Water."
Statistical, 8. Mr. J. T. Hammick, "On the Judicial Statistics of England and Wales."
Pathological, 8.
Ethnological, 4. Annual Meeting.
Royal Inst., 3. Prof. Miller, "On Spectrum Analysis."
R. Horticultural, 3. General Meeting.
WED ...Geological, 8. 1. Capt. Spratt, R.N., "On the Bone Caves of Malta." 2. Mr. R. Tate, "On the Lias of the North-east of Ireland." 3. Mr. R. Tate, "On the Fossiliferous Development of the Zone of *Ammonites angulatus* in Great Britain." 4. Mr. F. M. Burton, "On the Rhætic Beds near Gainsborough."
R. Society of Literature, 4½.
Archæological Assoc., 8½.
THUR ...London Inst., 7. Prof. Bentley, "On Botany."
Zoological, 8½.
Mathematical, 8.
Royal Inst., 3. Prof. Huxley, "On Ethnology."
Royal, 8½.
Antiquaries, 8½.
FRI .....Linnæan, 3. Annual Meeting.
Royal Inst., 3. Prof. Herschel, "Falling Stars of 1866-7."
SAT .....Royal Inst., 3. Prof. Huxley, "On Ethnology."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 8th May, 1867.

129. Bill—Metropolis Gas (amended).
135. ,, British Spirits.
176. National Gallery—Return.
245. Poor Rates and Pauperism (Ireland)—Return.
249. British Museum—Accounts.
Public Petitions—Twentieth Report.

SESSION 1866.

442. (A X.) Poor Rates and Pauperism—Return (A).

Delivered on 9th May, 1867.

118. Bill—Labouring Classes Dwellings Acts (1866) Amendment.
248. Sea Fishery (Scotland and Ireland)—Return.
254. Population (Staffordshire)—Return.
268. Metropolitan Local Government, &c.—Second Report.

SESSION 1866.

251. (III.) East India (Military Finance, &c.)—Memorandum.

Delivered on 10th May, 1867.

136. Bill—Parliamentary Registration.
138. ,, Execution of Deeds (amended).
139. ,, Metropolis Subways.
217. Reformatory and Industrial Schools—Return.
237. William O'Brien and Bartholomew Keily—Reports.
250. Turnpike Trusts (Devizes)—Memorials.
269. New Palace (Westminster)—Correspondence.

Delivered on 11th May, 1867.

241. Chain Cables and Anchors—Correspondence.
270. East India (Army)—Instructions.
281. Sugar and Molasses—Return.
Public Petitions—Twenty-first Report.

Delivered on 13th May, 1867.

140. Bill—Bridges (Ireland) (amended).
142. ,, Brown's Charity.
143. ,, Tancred's Charity.
144. ,, Sir J. Port's Charity.
194. Public Income and Expenditure—Account (31st March, 1867) (corrected copy).
275. New Boroughs—Return.
283. West Indies—Papers.
282. West India Colonies—Return.

Delivered on 14th May, 1867.

140. Bill—Bridges (Ireland) (amended) (corrected copy).
141. ,, Banns of Matrimony.
183. Jamaica—Proceedings of the Courts Martial.
253. Police and Improvement (Scotland) Act—Returns.
276. Vaccination—Memorial.
278. Seamen's Savings Bank—Account.
280. Merchant Seamen's Fund—Account.
Ordnance Survey and Topographical Depôt—Report.

SESSION 1866.

442. (D.) Poor Rates and Pauperism—Return (D).

Patents.

From Commissioners of Patents' Journal, May 10th.

GRANTS OF PROVISIONAL PROTECTION.

Agricultural implements—3436—W. Exall.
Agricultural implements—1168—W. E. Gedge.
Awnings, &c.—503—H. J. Cole and W. C. Horton.
Axles—1156—S. Cocker.
Bale fastener—1162—H. Fassmann.
Bottles, feeding—1010—W. C. Webber.
Charcoal, peat—1190—J. H. Johnson.
Cutlery—1196—W. R. Lake.
Devices, &c.—184—W. P. and G. Phillips and D. Pearce.
Enamel—1118—J. Oakden and J. Pickin.
Fibrous materials, opening—1019—W. Tatham and W. T. Heap.
Gas, &c., measuring—1158—R. H. Frith.
Glues, &c., keeping warm—1208—T. Booth.
Hat guards—1154—L. Davis.
Hoes, horse—1181—W. F. Wilkinson.
Hooks, tackle—1202—A. M. Clark.
Lamps—1166—D. Fryer.
Mash tuns—1150—J. Millward.
Meat, &c., preserving—1200—C. E. Brooman.
Motive power, economising—973—H. A. Bonneville.
Motive-power engines—1164—J. Peebles.
Paper, &c., coating—659—W. R. Lake.
Petroleum, &c., burning—1180—S. J. Mackie.
Ploughs—1094—H. B. De Beaumont.
Pulverizing apparatus—1206—C. D. Abel.
Railways—851—M. Holland.
Refrigerators—787—F. Gregory.
Roadways, &c., construction of—1018—H. Buss.
Rudders, hanging—956—H. A. Bonneville.
Sewing machines—1186—L. B. Bruen.
Sugar machines—1178—W. R. Lake.
Tools, machine—334—S. Alley.
Turnips, &c., preparing—1204—H. Smith.
Turrets, &c.—1176—J. Westwood.
Vapour apparatus—1188—C. F. Whateley.
Weights, raising—990—J. Pickering.
Wheels—1160—J. Atkinson.
Wools, &c., destroying vegetable matters in—1198—C. E. Brooman.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Binders for papers, &c.—1313—N. M. Shafer.
Boots, &c.—1256—W. Snell.
Steam engines—1351—N. W. Wheeler.
Valves—1306—J. Thévenet.
Valves—1348—N. W. Wheeler.
Valves—1350—N. W. Wheeler.
Ventilators, &c.—1349—N. W. Wheeler.
Yarns—1340—A. H. Gilman.

PATENTS SEALED.

2953. J. Ingram and H. Stapfer.
2959. J. R. Cadman.
2972. W. Clark.
2983. T. S. Truss.
2985. H. Hughes.
2986. T. Page.
2995. J. Nichols.
2996. E. C. Hodges.
2997. L. Bernieri.
3002. W. Grüne.
3013. J. W. Hurst.
3020. I. Evans.
3023. W. E. Gedge.
3024. J. H. A. Gruson.
3047. C. E. Brooman.
3056. W. Clark.
3072. C. E. Brooman.
3164. W. Butler and A. Dalgety.
3282. W. R. Lake.
207. J. Nodder.
229. W. Snell.
520. W. H. Samson.
710. J. A. Fussell.

From Commissioners of Patents' Journal, May 14th.

PATENTS SEALED.

3007. J. H. Johnson.
3012. J. M. Dunlop & F. Crossley.
3016. J. Bolvin.
3018. D. Kirkaldy.
3026. E. W. Morton.
3028. T. Earp and R. Ashton.
3030. A. P. Price.
3031. T. Wardlaw.
3033. J. H. A. Gruson.
3035. J. H. A. Gruson.
3036. W. A. Gibbs.
3037. T. Whitley.
3038. J. L. Clark.
3043. G. Haseltine.
3048. J. Robertson.
3049. J. H. A. Gruson.
3051. J. H. A. Gruson.
3061. P. G. B. Westmacott.
3063. P. Gledhill.
3074. G. F. and J. Stidolph and J. R. Morley.
3079. W. H. P. Gore & R. Green.
3112. N. S. Shaler.
3134. G. Haseltine.
3157. W. Crighton.
3163. J. Pratt.
3186. G. Haseltine.
3189. W. H. Richardson.
3190. E. L. Paraire.
3238. F. C. Buisson.
3311. H. Hall.
215. E. Bellard.
231. J. Greenshields.
649. B. Snow.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

1148. W. Hirst.
1158. J. Wavish.
1180. T. W. and R. Condron and G. R. Hartshorne.
1210. R. F. Fairlie.
1244. G. Hunter.
1196. T. M. Gisborne.
1198. R. Wilson.
1205. T. N. Kirkham and V. F. Ensom.
1242. J. Hamilton.
1644. E. T. S. L. McGwire.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

1128. J. D. Dougall.
1178. J. Chatterton & W. Smith.
1393. J. Saunders and J. Piper.
1182. E. Lord.

Journal of the Society of Arts.

FRIDAY, MAY 24, 1867.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'Clock:—

May 29.—"On the Water Supply of the Metropolis in relation to the Conservancy of the Thames and its tributaries, and the demands of the Water Companies." By J. Bailey Denton, Esq.

Artizans' Visits to Paris.

The Council of the Society of Arts, feeling the importance of promoting the intelligent study of the Paris Exhibition and the manufacturing establishments in France by artisans of the United Kingdom, have appointed a Committee in furtherance of this object, and on their recommendation, have passed he followting minute:—

At the last and former International Exhibitions held in this country, arrangements were made by the French Government, to facilitate the visits of skilled artizans, and interesting reports on the exhibitions were made by them to their government. Believing that such visits on the part of skilled workmen to these great international displays not only exercise a beneficial influence upon the men themselves, but also upon the progress of industry in the country to which they belong, the Council of the Society of Arts have resolved to raise a fund to be employed, in aiding a limited number of English workmen to proceed to Paris for the purpose of studying the present French Exhibition.

To carry this object into effect, they have agreed on the following plan:—

1st. That a number of selected workmen (the number to depend on the amount of funds at the disposal of the Council) shall be assisted to proceed to and remain in Paris a sufficient time (say three weeks), for the purpose of making a careful study of the exhibition, and of such factories and workshops as they may desire to visit.

2nd. That every man so assisted shall, on his return, make a report to the Society of what he has observed during his stay, in reference to the special industry in which he is engaged, and that it be made a condition of the grant to each man that one-third of the amount be retained until his report shall be supplied to the Society.

3rd. The Council think it will be undesirable to fix the exact time for, or to prescribe the duration of, these visits, or to interfere with any of the arrangements the men may desire to make for their own accommodation; but, in order that they may take advantage of the facilities provided by the Commission organised by the French Government for the study of the exhibition, the men will be placed in communication with that Commission on their arrival in Paris.

4th. A considerable sum will be required satisfactorily to accomplish the important object undertaken by the Society, and, in order to raise these funds, the Council have determined to appeal to the members of the Society, who must be interested in the successful results of this movement, in the belief that they will not hesitate to join in a subscription for the furtherance of the undertaking; and they propose at the same time to communicate with the various Chambers of Commerce, inviting their counsel and support. The Council have decided to commence the subscription by a vote of one hundred guineas from the funds of the Society.

Members are invited to aid the Council in this undertaking by subscriptions, which should be forwarded to the Financial Officer at the Society's house.

Harvesting of Corn in Wet Weather.

The Council of the Society of Arts have resolved to offer the Gold Medal of the Society, and a Prize of Fifty Guineas, for the best Essay on the Harvesting of Corn in Wet Seasons.

The first part of such essay—after noticing the various systems at present adopted in damp climates for counteracting the effects of moisture upon cut corn in the field, and for avoiding such exposure in wet seasons by peculiar harvesting processes—should furnish a practical and analytic exposition of the best available means:—

1st. Whereby cut corn may be protected from rain in the field.
2nd. Whereby standing corn may, in wet seasons, be cut and carried, for drying by artificial process.
3rd. Whereby corn so harvested may be dried by means of ventilation, hot air, or other methods; with suggestions for the storage both in the ear and after threshing.
4th. Whereby corn, sprouted, or otherwise injured, by wet, may be best treated for grinding or feeding purposes.

The whole to be supplemented by a statement of practical results, and actual cost of each system described; and authenticated estimates of any process proposed for adoption, based upon existing but incomplete experiments.

The above requisitions are given suggestively; not to bind the writer to the order or to limit the treatment of the subject, provided it be kept within the scope of practical experience and utility.

The essays must be sent in to the Secretary of the Society of Arts on or before the 1st of January, 1868.

The Council reserve the power to withhold the whole or part of the prize, in the event of no essay being, in the opinion of the judges, of sufficient merit.

Subscriptions.

The Lady-day subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Food Committee.

A meeting of the Sub-Committee on Meat was held on Wednesday, the 8th instant. Present—Mr. Clare S. Read, M.P., in the chair; Mr. Ware, Professor J. Wilson, and Mr. Ludford White.

Mr. Herman Gebhardt attended at the request of the Committee, and gave evidence as follows :—

The Chairman—I believe Mr. Gebhardt you are a large salesman and commission-agent in the Metropolitan Cattle Market?—Yes.

Do you receive many cattle from abroad?—Those which are consigned to me are all from abroad—cattle and sheep too.

Can you give the Committee any idea of the number of cattle you sell per week?—It depends upon the season of the year. Formerly we did not sell so many in spring and winter, because the supply consisted principally of grass-fed beasts, which came from July up to Christmas; but of late years the extension of railways abroad, and the increased facilities of steam communication, have made a total revolution in the trade, so that now we get almost as many in winter and spring as we used to get in the summer and autumn. I will put before you a statement I took from the *Times* yesterday morning, showing that this week, to 6th of May, the importations of foreign cattle, including sheep, pigs, and calves, was 12,099 into London; whilst for the corresponding week in 1858 it was only 1,840; that is, only less than a tenth of the number. In the corresponding week of last year the number was 8,572, so that the increase in the present year has been over 4,000 head for the week. I have received on an average, between 300 and 400 beasts, and more than 2,000 sheep from abroad.

You are probably the largest foreign salesman in the market?—No: I should say there are two firms who sell as many as I do. As an individual, having no partners, I probably sell as many cattle as either of those two firms.

Has your business increased very much of late years?—Yes; in proportion to the increased numbers of cattle sent. Nine years ago there were only 1,800 head per week amongst us all; now there have been over 12,000, and my own business has increased in proportion; but I may say I had more of the 1,800 in proportion eight years ago than I have of the 1,200 now. My own business may have been doubled, while the importation has increased tenfold.

How long have you been a salesman in this market?—I have been eighteen years in this country, but before I came here I was the largest cattle dealer in Hamburg. I am a native of Hamburg, and when the tariff to England opened, I was the first of three men who commenced exporting beasts. Formerly it was the case that all the cattle were shipped from Hamburg, and they were brought there for the purpose of meeting a sale; but people opened their eyes, and they found they could do in two days what used to take a fortnight. A line of steamers was established, and the cattle were sent from various parts, by which the driving of herds long distances was saved. We still get cattle from some distant parts, but I hope they will not come any longer. I made a communication to Professor Simmonds at the Privy Council on this subject, because a question was asked in the House of Commons by Lord Dunkellin, and Lord Robert Montagu gave an answer that the late reappearance of the cattle disease was believed to have been occasioned by a cargo of white Austrian beasts. We have reason to believe that there is always more or less a rinderpest or cattle plague in some of the countries east of Hungary.

That you would call the home of the cattle plague?—Yes; I believe many salesmen here are of the same opinion as myself on that point. I think we should give the government every assistance when we apprehend there is anything wrong, because it is better to shut up part of the continental market than the whole; and if you allow cattle to come through these districts they may infect the whole of the cattle in their course, and the importation must be prohibited entirely. The great safeguard against rinderpest in this country is the very severe and stringent measures which the foreign governments adopt for their own protection. I received a letter this week, which I translated and sent to Professor Simmonds, stating that the Prussian government, the Bavarian government, and the government of Saxony have now totally prohibited the importation of Hungarian cattle. Professor Simmonds and Professor Browne have attended the market every day, in order that their attention might be directed to any case of disease which appears there, as it would not do for me to act as a common informer against the other salesmen. I had great suspicion that there would be 270 cattle smuggled through, and we waited for them coming in, but up to this time they have not appeared. I had a letter stating it was intended to attempt to smuggle these cattle through. The result was, in Saxony, Prussia, and Bavaria they said, "We will not allow a single Hungarian bullock to come into our country." A friend of mine, who lives at Vienna, had last week 120 beasts, and he got them as far as the Bohemian frontier by railway, and there they were stopped. These were Hungarian beasts, but they had been fattening for six months in Austria, and on that representation being made to the governments of Prussia and Saxony, they were allowed to pass. On their arrival here I showed them to the officers of the Privy Council, but they had no disease. I have no doubt there will be a good many more of these beasts come; but at present there are no cattle allowed to come from those districts which are regarded as the principal seat of the rinderpest, and such as do come are smuggled through. It was rumoured that a Polish Jew had got through the 270 beasts to which I have alluded; but I do not believe it, as, according to my advices, they would have been here by this time.

You think it unsafe to promote importation from that district?—I do not believe this Government have got the power to prohibit them; but you are protected by the other governments. There exists great jealousy in the trade. The Berlin jobbers send their principal supply from Prussia. They are jealous about the white beasts, because they lower the market. Last Monday beasts were unsaleable in the market. There were not buyers for the whole lot. There has not been such a glut of cattle for years as there was last Monday, and we are over-done just now with this particular class of meat. For fear of rinderpest the Austrian and other Governments will not allow Hungarian beasts to enter their territories, and that is a great protection to this country.

To return to your own trade—you say that now-a-days you receive a great number of these foreign cattle in the winter-time and spring. Do you attribute that entirely to the development of railway and steam-boat communication, or do you think it is in some degree attributable to the improvements in cattle-breeding and grazing on the Continent?—I attribute it chiefly to the development of railways, because we can get beasts here now which we could not get formerly. We have now regular steam communication with Sweden, and the cattle trade with that country has sprung up within the last two years. Previous to that the only communication with Sweden was by sailing-ships. There is now a line of very fast steamers, as also to the north of Denmark—Jutland. Formerly, all the cattle from those parts had to be driven to Hamburg and shipped from that port to London; now we have steamers from Denmark direct. Within the last week we had two cargoes, consisting of 200 beasts, which, two or three years ago, we should not have dreamt of getting. From Spain I am in the habit of receiving every week a cargo of 100 or 150 beasts. There are large steamers now entirely employed in the cattle trade from Geestemunde, and it is the same with Portugal. Then a fresh trade has sprung up from France. It shows how the circumstances of countries alter. I remember, seven or eight years ago, the French came over here to buy cattle—now we receive a large number of cattle from France; those from Normandy being remarkably beautiful animals, as good as any English beasts which are bought by the West-end butchers.

They are a sort of half-bred shorthorn, are they not?—You would not know them from the English beasts. If we could only exclude that corner—Hungary—where we always run the risk of disease, I think there is wonderful scope for the importation of foreign cattle.

Does not your observation with regard to France sending us cattle, instead of sending here to buy them, indicate that some improvement in agriculture must have taken place?—Yes. I believe in France it is so. Some years ago they were very short indeed of stock. The present facilities for sending cattle here, added to the inducement of high prices, have tended to increase the importation from that country; indeed I am told that cattle grazing in Normandy, paying freight to this country, will realise as much to the farmer as he would get by sending them to Paris and paying the duty.

Professor Wilson.—That observation has equal bearing with regard to France, Sweden, and Denmark.—It is, no doubt, the fact that cattle intended for our market are cared for and fed differently to what is the case for those designed for home consumption, because inferior beasts, they know very well, will not fetch good prices in this country, and it does not pay them to send them here. At the same time I do not think they are advanced in agriculture sufficiently to supply us to a very large extent at present with well-bred and well-fed stock; but that they are greatly improving in this respect there can be no doubt, and it is their policy to do so.

Mr. Ludford White—Do you not consider that the high price of meat in this country of late years has been a great incitement to the exportation of cattle from the continent?—No doubt, but there has been a great deal of money lost lately by the foreign dealers. We had high prices last year; people abroad thought we had no cattle left, and all that sort of nonsense. The cattle I am selling now were probably bought in as store stock last November, and they are sold by live weight. Cattle feeding is done on a very large scale abroad—not like the little farmers here, with 20 or 30 beasts each. If you go into the district of Magdeburg you will find 400 to 500 beasts on one estate. If you ask how much per head for them, they will tell you, "These beasts cost me so much per head alive; so and so are my terms." If you do not like the price they will wish you "good morning." Then the jobbers will go and offer an advance of so much per cent., and this year, I have no doubt, some of them will be ruined. I believe some of them gave more for the cattle they bought in last November than they could sell them for since. Last year mutton made 6s. per stone, which is now selling at 4s. 8d., or 7d. per pound instead of 9d.

The Chairman—Then I think I am right in the assumption I started with, that the increased importation of foreign stock is, in a great measure, due to the improved agriculture of those countries?—No doubt to a great extent it may be so. I would say this—first of all we have cattle in the winter from countries from which we formerly received none, because there were no facilities for conveyance; but when people find a market open to them they naturally try to increase the quantity, and to improve the quality of their stock; and no doubt they have gone on improving their stock very fast. They imported hundreds of bulls and rams from this country for the sake of improving their breeds of stock, till the cattle-plague came amongst us; since then all importations from England to the Continent have been prohibited. One country is afraid of the other. You could not possibly send a bull or a ram to these countries now, if you paid ever so much money to do it. I have myself a fine herd of pedigree cows in this country. I have never had the disease amongst them, notwithstanding I had foreign sheep located not far from them, and on one occasion some of them broke through the hedge, and got amongst the cows. I have got these cows now, and I cannot send one of these to the Continent. The foreign breeders would improve their stock most by improving their blood.

Professor Wilson—They are all striving for that; but it will be years, probably, before they will take any more stock from England for breeding purposes.

The Chairman—Is it your opinion that the continental farmers are desirous of improving their stock, and the system of feeding their cattle?—No doubt about it; farming property abroad is at least double the value it was.

Mr. Ludford White—And you believe the supply to be illimitable?—If you go to these countries and see the amount of stock they have left, the supply may be said to be almost unlimited; because look at the extent of grazing country they have. Gentlemen travelling through Germany must have seen the vast tracts of fine meadow land, which are capable of being mowed two or three times a year for hay, and then leave fine pasturage. You do not see such meadows in Leicestershire or Nottinghamshire, only in Holland and Germany.

Professor Wilson mentioned that he was in Jutland last year, and he was assured, on the most unquestionable evidence, that they could supply this country with 40,000 cattle per annum with the greatest ease. Last year they exported 39,000 head of cattle, and they could increase that number by 10,000 a-year for almost any time to come. He had no doubt that was quite within the mark of the capabilities of that country. In addition to which, they could send us 3,000 or 4,000 tons of oil-cake annually to feed our own cattle upon.

Mr. Ware—In what condition do the foreign cattle come to the market as compared with the English?—Generally speaking, in very good condition, because it does not pay a man to send a bad quality of stock to our market; whether an animal fetches £10 or £30, there is the same expense of conveyance, &c., and no one dreams of buying foreign cattle for store. When a middling animal is slaughtered, it is sold at a low price, and the same may be said of all cattle which have been fattened after having been worked at ploughing. They are very fat inside, but they do not make good meat.

Do they suffer much from the voyage?—That depends upon the weather and the accommodation in the steamer. I believe there has been a wonderful improvement in this respect. I was examined on this subject before the Committee of the House of Commons in connection with the Bill of the Harwich Steam Company. I believe the shorter you can make the sea passage the better it is for the animals. I give a perfectly unprejudiced opinion on this matter, as I am not connected with any railway or steam-boat company, and, as I have generally something to do with every cargo of cattle that comes to London, I may be considered a fair judge. I have found that when a cargo of cattle from Hamburg arrives at Blackwall, which is the nearest point for landing, as soon as the steamer slackens speed, to come to her moorings, the current of air into the hold is so much decreased that the animals begin to suffer greatly from the heat. In weather like this it would be a dangerous thing to slacken speed at Gravesend, but they must gradually slacken speed in coming to an anchor in the Thames. In hot weather the animals come from the lower hold in a very distressed condition, and it always is a great point to get them landed as soon as possible after their arrival. On the passage the hold is supplied with air by wind sails carried down the hatches, and as these steamers run at a speed of ten miles an hour a considerable current of wind is driven down the hold. It is of the first importance that the cattle should be removed from the steamer immediately on their arrival at Harwich, and then sent by rail, as by that means a saving of 10 or 12 hours is effected in bringing them to market.

Professor Wilson—Have you seen the new steamers which have been put on the Baltic line from Hamburg and Denmark to Leith?—No, I have not.

Professor Wilson—In those steamers every provision and precaution is made for the accommodation and comfort of the animals conveyed in them, and the percentage of waste which the cattle sustain is very

small indeed. The whole of the arrangements on board are of the most excellent description, and the animals are landed immediately upon their arrival.

Mr. Gebhardt—As being a large representative of the foreign cattle trade, I considered it my duty to state my views on this subject before the Committee of the House of Commons, and I have expressed my opinion that the sea passage should be as short as possible, and that the animals should be released from the vessel as soon as possible after arrival. The principal trade in cattle lies in the hands of the General Steam Navigation Company; but they have only one wharf at Blackwall, which is not suitable for a trade like this, as there is not half room enough, and there is no proper accommodation for the cattle on their being landed there. They have sometimes to remain there all night if the steamer arrives too late for the cattle to be sent away that day. You do not know the mischief that is done to the animals. When the cattle are landed and sent away immediately after their arrival, they are generally in such a condition you would hardly think they had been 48 hours at sea.

Mr. Ludford White—Which do you consider affects the cattle most prejudicially, the journey by sea or by railway?—That by sea, undoubtedly. On the railway they have plenty of air and sufficient room. The overcrowding of the cattle on the railway is provided against. They only carry a certain number of animals in one truck. I have had hundreds of cattle consigned to me, which came up from Harwich by the Great Eastern line, and I do not allow them to be unfairly loaded, but whilst they are in the hold of the vessel they are beyond my control. The regulation as to the number of cattle which a steamer should be licensed to carry would hardly meet the case, inasmuch as a steamer which could accommodate 200 Jutland cattle could not stow 150 of the larger breed of animals which come from Magdeburg and other parts of Germany. Facilities of traffic are best promoted by competition in the trade—railways against steamers, and steamers against railways—and the dealers will always find out which is the best way of sending the cattle.

The Chairman.—I will ask you, supposing there should be a market established, say at Thames Haven, with suitable slaughter-houses, for the slaughtering of all the foreign cattle at that or some other spot near, so that these animals might be excluded from the Metropolitan Live Cattle Market altogether, do you think such an arrangement would tend materially to reduce the supply sent to this country?—A very great deal; in fact it could not be done. If it were tried I am sure it would have to be given up. Imagine a day like this—[referring to the heat]. We are only now at the commencement of summer. You slaughter the animals at Thames Haven, and by the time you get the meat into the salesmen's shops at the market how much do you think would be fit for consumption? It might answer better in winter, but even then it would place restrictions upon the trade which would be most undesirable. Practically it could not be done, I am quite convinced. You must understand that the meat trade in London is not all carried on by the carcase butchers. A large number of beasts are killed by the retail men, from which they derive a considerable portion of their profits in the sale of the offal. It is calculated that the retail man is able to make 15s. or £1 more of the offal of a bullock than the carcase butcher can do, who has to sell it to wholesale dealers in the same way to be retailed by them. In summer time the small retail butchers would not kill a bullock or a sheep till late at night, so as to have it fresh for his customers in the morning. Imagine such a supply of foreign stock as we had last Monday, when there were 2,430 beasts and 8,666 sheep in the market; how is it possible any man should know what quantity he should kill? Besides, if I were a retail butcher, and I were in my shop, I should know I wanted a bullock to be killed for the supply of my customers. I could have it killed at the time I wanted it, to suit my trade. But if I am a carcase butcher, if I kill 20 beasts and only 10 are wanted, I have 10 left on my hands; if, on the other hand, I only kill 20, and 40 are wanted, I am 20 short in the supply I require. How can you possibly regulate the supply in that way?

The Chairman suggested that the telegraph might be employed for the purpose. The distance to Thames Haven was not great, and there was direct communication with London.

Mr. Gebhardt—Yes; but the retail butchers would not go in the evening, and say to the carcase butcher, "I shall want a carcase to-morrow morning." The consequence would be some parts of London would be partly without meat, and some parts would have three times more than was wanted. The foreign cattle constituted at least one-half of our supply at present, and it was in much larger proportion than that during the cattle plague.

The Chairman—You suggest that if the system of slaughtering the foreign cattle at Thames Haven were adopted London would be sometimes deprived of half its proper supply of meat, and at other times the markets would be glutted. Have you ever found that to be the case at present?—We find sometimes the prices are fabulous, and sometimes they are equally low, because the supply has been in excess of the requirements. The place of slaughtering which you suggest might be available to some extent in the winter time; but in summer it would be quite impossible to use it. It would be the very thing, in my opinion, to restrict the importation of foreign cattle.

The Chairman—I did not suggest that the system should be limited to one place; besides Thames Haven, you might do it at Southampton and Leith?—It might be done in places of 10,000 to 20,000 inhabitants, but to attempt to feed three millions of people in this artificial way could never be done, nor do I see any good that could arise from it. You bring the beasts into London, but none are allowed to go out again. You can make yourselves safe against the cattle plague, first, by not allowing any cattle to come in from the countries which have got it.

The Chairman—But you cannot always tell where the cattle comes from?—The governments abroad assist you, because they will not let them come into their country. They have had the plague in Holland, and we have not had a bullock from there. You can stop them at the wharf; and if they are brought into market they can be stopped there.

The Chairman remarked, unless something of this sort were done, there was no probability of getting rid of the cattle-plague in London.—My second proposition is that every animal should be inspected on its arrival here; and let every animal be killed within a certain time, which is the regulation at the present time. With regard to the disease that has lately broken out at Limehouse in a cowshed, I do not find that it can be traced to any foreign beasts.

The Chairman—This Committee has been appointed for the purpose of inquiring into the means by which the supply of meat to this country can be increased, and the price cheapened; and you are of opinion that there is immense scope on the Continent for increasing the supply; and that as the facilities of transit are enhanced the development of the foreign cattle trade will continue to progress?—Yes; no doubt; if you do not clog the trade with unnecessary restrictions. You have a still better remedy against the cattle plague. There might be a separate market for foreign live cattle, away from the other; they need not mix with the English beasts; and as they left the market only to be killed, they would not take the disease into the country. I think you have the remedy entirely in your own hands, in the way I have suggested. Farmers in the country can send their cattle to other markets in the country without sending them to London at all;

though the Metropolitan Market is always considered to be the best.

The Chairman—The Metropolitan Market is, no doubt, the great market for live cattle, and in course of time you might develop another permanent market; but at present there is no other market at which you can sell the quantity of cattle you can sell here?—No; but at present the farmers in the country have the opportunity of sending their cattle to the provincial markets without their coming to London at all. Those northward of London have the Hitchin market.

If a person required foreign cattle, why should he not go down to Thames Haven to buy them?—You must make a complete revolution in the trade; because the retail men, who sell their two or three beasts per week, would be brought into the position of mere meat-dealers, and it would involve a loss to them of 15s. or £1 in the matter of the offal. In the case of the contracts for the supply of meat for stores for troops and the navy at Deptford, the contractor is obliged to dispose of his offal wholesale; but the retail man makes a considerable profit by the retail of the offal; and, as I have said, I do not know how this slaughtering at the place of debarcation could be carried on at all in the hot weather of summer. The great secret is, in summer time, to kill the meat as late as possible, so as to give it time to "set" before it is taken to market. I have seen a great deal of meat that has come from Thames Haven stopped as unfit for food, and if it had not have been stopped no respectable butcher would have bought it. The meat sent from the country in quarters is packed in cloths and hampers; but it would be impossible to do that with the quantity required for the metropolitan market.

But it comes in that way from Aberdeen?—That is nearly all sent by private butchers. It does not come from any abattoirs. With regard to the danger of cattle plague, if you bring the cattle to Harwich to be killed there, you might as well bring them to London. The best thing the Government did, in my opinion was to drive every cow out of London, for the cowsheds are the hotbeds of disease. For my own part, I would not allow a single cowshed in London, as the system of keeping and feeding is altogether bad, and the danger of the spread of cattle disease is greatly increased by that means. I consider it would be a great advantage that cows should be kept in the country, inasmuch as if the animals are properly fed, the whole of their food is produced in the agricultural districts; and roots, as well as hay and grass, where they are grown, must all be brought up from the country. I think there ought to be legislation on the subject of the London cowsheds. If there were no cows kept in London for milking purposes, even if the plague was brought into London by foreign cattle, it would do no mischief, because there would be nothing to catch it, whether the cattle were brought from Harwich or Thames Haven.

Mr. Ludford White—Would it not increase the price of milk in London to abolish all the cowsheds?—No; the cows would be kept near London, and on the spot where the food is produced. The principal portion of the London supply of milk comes from the country now.

In reply to further inquiries, Mr. Gebhardt expressed his opinion that the dead meat trade from the continent might be developed in the winter. All the objections he had stated applied principally to the hot period of the year; but he had seen beef, even in winter, in such condition that one would not like to eat it, and when wetted with sea water it very soon became in a bad state; and large quantities had been condemned at Blackwall. The value of the offal of a bullock in good condition, including the hide, was from £3 5s. to £3 10s., and the depreciation upon that according to the circumstances of having a retail market or not for the edible portions, generally purchased by the poorer classes, was from 15s. to £1. The tongues were sold wholesale at 3s. 6d. each, but if he wanted to buy one he must give 5s. for it. He believed no foreign beef was bought by the principal West-end butchers, except sometimes the very best quality of French beasts, and they must be very choice for the West-end men to buy them. The foreign meat principally goes to supply contracts for the army and navy, and a great many are disposed of to the carcase and retail butchers of Whitechapel and other portions of the east of London. At last Monday's market the best price was 4s. 10d. a stone, and some was sold at 4s.; the average price of the market was 4s. 6d. per stone. The cost of transit of cattle from Hamburg is about £2 per head; from Berlin £3, and from Vienna £4 to £5 per head. The concession to the consignee is about 5s. 6d. per head, which includes the market charges. It was impossible for him to say at what cheaper rate the foreign producers could raise their stock as compared with the English farmer; and unless prices kept up, money would be lost upon store stock bought at high prices last autumn. Many graziers had sold their stock when fat at almost the same price which they gave for them as stores; and this remark equally applied to sheep.

Cantor Lectures.

"On Pottery and Porcelain." By W. Chaffers, Esq.

Lecture VII.—Monday, May 20.

English Porcelain.

The subject of Mr. Chaffers' concluding lecture was English porcelain. He began by observing that the invention of the manufacture of porcelain in this country was much earlier than had been generally supposed; for a patent was taken out by John Dwight, of Fulham, in 1671, while that of Chicagneau, of St. Cloud, in France, was not granted until 1702, nearly thirty years afterwards. The first discovery in that country was accorded to Louis Poterat, of Rouen, who obtained letters patent in 1673, but the ware never succeeded, and only a very imperfect description of china was produced; Dwight's porcelain was therefore made two years previously, and the words of his patent are these:—"For the mistery of transparent earthenware commonly known by the name of porcelane or China." The fact is corroborated by Dr. Plot, in his "History of Oxfordshire," written in 1677, who says—"He" (Dwight) "hath found ways to make an earth white and transparent as porcellane, and not distinguishable from it by the eye, or by experiments, that have been purposely made to try wherein they disagree." The principal test of porcelain being its transparency, there can be no doubt about the nature of the ware here spoken of. A specimen of his porcelain, of about 1735, has recently been discovered; it is a bust of George II., of small life-size, in porcelain, which, from the peculiar modelling, and the similarity to Dwight's busts in stoneware, leaves no doubt of its origin. It is in the possession of Mr. Reynolds. The manufactory at Stratford-le-Bow was established about 1730. Thomas Frye, an eminent painter, appears to have been instrumental in bringing the china to that perfection for which it was celebrated. In 1753 the works passed into the hands of Messrs. Crowther and Weatherby. In an interesting document, accompanying a Bow china bowl which was presented to the British Museum by the painter himself, we are told that they employed 300 persons; about 90 painters and 200 turners, &c., all under one roof. In 1775 the Bow works were sold to Mr. Duesbury, and all the moulds and implements transferred to Derby. [Several specimens of Bow and Chelsea were exhibited.] The celebrated manufactory at Chelsea was established about the same time as Bow, and the early productions are frequently mistaken the one for the other; but, fortunately, the finer pieces are usually marked with an anchor in red or gold. The period of its greatest excellence was from 1750 to 1765. It has been thought that Venetian workmen were first engaged here, from the great similarity of the two wares both in painting and gilding, added to which the mark

upon both is an anchor. This manufactory was set on foot by Mons. Spremont, a Frenchman, and he acquired a great fortune. The beautiful vases in the French style of grosbleu and morone, with beautiful paintings, are well known, and are at the present day much appreciated, the prices they command being as high as are paid for the Sèvres porcelain. These works were also bought by Mr. Duesbury, of Derby, in 1769, who continued them at Chelsea until 1784. The china made by him was called Derby Chelsea, and is known by the mark of a D, crossed by an anchor. Although the Derby works originated as early as 1750, it does not appear that any china of a high character was produced, but principally services and small chimney ornaments; and it was not until 1769, on the purchase of the Chelsea works, and a few years after of those at Bow, that they rose to any importance. In fact, with the best workmen and painters of those great establishments, and all the moulds and models from them, the Derby manufactory may be considered as the Bow and Chelsea manufactories continued in another locality. Some beautiful examples of porcelain in the Chinese style were produced, and they seem also to have copied their marks, as well as their style of decoration; but their ordinary trade mark was at first a D crossed by an anchor, called Derby Chelsea, and after Royal patronage was accorded, in 1780, it was changed to a D surmounted by a crown—this was called Crown Derby, and was used by the successor, Mr. Bloor, down to 1830. The works ceased in 1848. The next porcelain manufactory of importance was Worcester, established chiefly through the exertions of Dr. Wall, who formed a company in 1751. The services made here were held in much estimation, and although produced at a cheaper rate than Bow or Chelsea china, were better for use, and not so subject to crack with hot water. An important means of decorating porcelain was introduced here in 1759, by transferring impressions from engraved copper plates on to the surface of the ware. It was adopted almost simultaneously with Liverpool, the invention being claimed by both, and specimens of these productions are found bearing the names of Sadler and Green, of Liverpool, and Richard Holdship, of Worcester, dated in the same year. Bat-printing succeeded the printing from copper plates on paper; the impression being taken from a copper plate by a piece of glue (called a glue bat), which received the pattern on its surface in oil, and being pressed on to the surface of the ware, the design was transferred; it was then dusted with colour and baked. The porcelain made from 1760 to 1780 was of a superior quality, and the colours used on decorative pieces approached very closely to those of Chelsea. In 1783 the manufactory was purchased by Mr. Flight, afterwards Flight and Barr, and many clever artists were engaged; it remained with them and their successors until 1840, when the two principal manufactories of Worcester, Messrs. Flight and Barr, and the Messrs. Chamberlain, were amalgamated, the concern taking the name of the latter. Chamberlain's works were established in 1786, and acquired a great reputation, being especially patronised by the Prince Regent, for whom they made a service which cost £4,000. Another full service for the East India Company at Madras was supplied at a still higher price. The taste for gilding and bright colours caused this great increase of price, for it appears that nearly £1,000 per annum was paid by the firm for gold alone. Caughley, near Broseley, Shropshire, was celebrated for porcelain. Mr. Turner, an engraver, from Worcester porcelain manufactory, made great advances, especially in services for the table; he invented a beautiful blue, which was printed on the ware in Chinese designs. The well-known "willow pattern" was produced here in 1780, which, even at the present day, is in great demand; this was the first blue printed table service made in England. The porcelain manufactory of Nantgarw was established by a Mr. Billingsley, in 1813. He had some time before produced his beautiful transparent ware at Pinxton, but its expensive character prevented it from becoming successful, and it was abandoned; he, however, revived it at Nantgarw, and it was so much admired that Mr. Dillwyn, of Swansea, made arrangements with Billingsley to superintend the production of it there also. Nearly all the ware made at Nantgarw was purchased in the white by Mortlock, a china-seller of London, and decorated in the metropolis. The favourite patterns at both the above-named places were pink roses heightened with gold. Mr. Rose, of Coalport, was a celebrated potter, and he established himself there about 1780. He was not, however, contented with such limited operations, but as the Caughley, the Swansea, and the Nantgarw works were successively relinquished by their owners, he became the purchaser, and incorporated them with his own, retaining Billingsley as director of his manufactory. The patterns known as the "worm sprig," the "Tournay sprig," the old "willow pattern," and the "blue dragon," remained staple articles. His decorative porcelain he marked "Coalbrookdale," which was another branch of his Coalport works. William Cookworthy, the inventor of hard porcelain, commenced his experiments as early as 1758, but it was not until 1768 that he considered it fully developed, and in that year, in conjunction with Lord Camelford, he took out a patent and commenced operations at Plymouth. The materials employed were called growan stone and growan clay, which answered to the ingredients of the Chinese porcelain, *kaolin* and *petuntse*. The difficulties found in proportioning them properly, so as to give exactly the necessary degree of vitrification and no more, and other niceties with regard to the manipulation, discouraged them in their proceeding in the concern, and, after expending on it between two and three thousand pounds, they sold their interest in the patent to Mr. Champion, of Bristol. The works were, however, carried on for nearly six years, and a considerable amount of ware was produced. Cookworthy engaged the services of a clever French artist, who produced the articles modelled in the form of shells and rock work, which became great favourites for the table. In 1774, the patent was sold and transferred to Mr. Richard Champion, of Bristol. He made some beautiful ware, but the great outlay prevented it being remunerative, and in three or four years he was compelled to give up the manufacture, and sold the patent to a company of Staffordshire potters. Various other porcelain manufactories were described; among these the New Hall China Works at Shelton, the first of the kind in Staffordshire. They had purchased Champion's patent, intending to make hard porcelain, but in a short time this was abandoned, and they made the usual English soft paste china, in which a great proportion of bone dust was mixed. The important china works at Stoke-upon-Trent originated with Josiah Spode in 1780. Great improvements were made by him and his sons in the composition of porcelain, and they introduced a fine and durable material called iron stone china, which was largely exported to France, to the great injury of the French trade. The Prince of Wales visited the works in 1806, and he appointed Spode potter to his Royal Highness. About 1827, Messrs. Copeland and Garrett succeeded, the works being still carried on by Mr. Alderman Copeland, and the choice pieces which emanate from this establishment vie with the famed *pâte tendre* of old Sèvres, while the jewels which glitter upon it remind us of the lines in Shakespeare about gilding refined gold or painting the lily. On others the exquisite paintings are veritable works of art, and the beautiful bisque figures are unapproachable. Mr. Thomas Minton established works at Stoke-upon-Trent in 1790. He made porcelain in the Worcester style and realised a handsome fortune. He died in 1837, and was succeeded by his son, Mr. Herbert Minton, who attained great celebrity as a potter, and brought the ware generally to great perfection. He revived the manufacture of encaustic tiles, and by employing the most expert artists, the most skilful chemists, and sparing no expense in his

numerous experiments to improve the colours, the body of the ware, and the decorations, he stood unrivalled in his art. His successors, Messrs. Michael Daintry Hollins and Colin Minton Campbell, have pursued the same course, and with untiring energy and zeal seconded all his efforts. Mr. Chaffers remarked that England has indeed reason to be proud of the rival potters, who have furnished forth their specimens of porcelain to the Paris Exhibition of 1867. Only two have exhibited, but the names of Minton and Copeland have added lustre to the English potters' art, and have borne away the palm of victory. Mr. Chaffers had on the table some fine specimens of the beautiful china produced at Rockingham by the Messrs. Brameld, from the year 1820, under the protection of Earl Fitzwilliam, the owner of the estate at Swinton. The china was of a superior description, and the painting and decoration generally of the highest order. The manufactory was discontinued in 1840. The important manufactory of porcelain at Lowestoft was established about 1756, and it is remarkable that the recollection of its existence, and the productions which emanated from it, should have been lost sight of and gradually died away, although it was in active work for nearly fifty years, and only ceased in 1802. But although this is the case at a distance from the locality, it is well remembered by the older inhabitants of Lowestoft, and the houses in the vicinity are teeming with its china. In fact, it is to be found all over England, but is usually, for want of a truer name, called Oriental, being a sort of hybrid ware, which nobody who knew what real Chinese porcelain is could for a moment mistake. The painting on the ware, too, is undoubtedly English, and the very touches of the artists can be identified. Its greatest prosperity was from 1770 to 1800. The question about hard paste being made at Lowestoft is placed beyond dispute; it was probably introduced about 1775 after Champion's failure. There are several persons now living who can testify to the fact that no Oriental porcelain ever came into the factory to be decorated; yet this is the opinion of many who have not duly considered the matter, and who imagine that what is now called Lowestoft was actually Oriental china, painted only at that place. Mr. Chaffers referred those of his hearers who wished to judge for themselves to a large collection of Lowestoft china, which he had obtained from the gentry of the vicinity, and which was now exhibited in the South Kensington Museum.

The CHAIRMAN said this lecture closed the Cantor Lectures for the present Session; and he felt sure that he expressed the sentiments of all who had heard Mr. Chaffers' course, when he said they were deeply indebted to that gentleman for the large amount of information he had brought before them. The lectures had been made additionally interesting by the very numerous and valuable specimens which Mr. Chaffers had been enabled to place before his audience, illustrating the various manufactures referred to in the lectures. In the name of the audience, he begged to tender their thanks to Mr. Chaffers.

THE ROYAL ALBERT HALL OF ARTS AND SCIENCES.

The first stone of this hall was laid by Her Majesty the Queen, on Monday morning last, on the site, north of the gardens of the Royal Horticultural Society at Kensington. Her Majesty, accompanied by the members of the Royal Family, arrived at half-past eleven, and was received by His Royal Highness the Prince of Wales, the Chairman of the Provisional Committee, and the Duke of Edinburgh. The Prince of Wales read the following address:—

"May it please your Majesty,—

"The report which, as President of the Provisional Committee of the Hall of Arts and Sciences, I have the honour to lay before your Majesty will be found to contain a brief outline of the origin and progress of the undertaking to the present time.

"It is not necessary for me to remind your Majesty that the building of which you are graciously pleased to lay the first stone to-day is one of the results of the Exhibition of 1851, and that it forms a prominent feature in the scheme contemplated by my dear father for perpetuating the success of that Exhibition by providing a common centre of union for the various departments of science and art.

"I cannot doubt that to your Majesty the events of this day, with their manifold associations, must be full of mournful interest. For myself, I need not say that, sharing these feelings, it is also with gratification that I find myself co-operating in the endeavour to give effect to a plan which had commended itself to the judgment of my father.

"Your Majesty's presence to-day will be the best encouragement to us to persevere in the work, and render it in all respects worthy of the object for which it is designed."

To this Her Majesty made the following reply:—

"I thank you for your affectionate and dutiful address. It has been with a struggle that I have nerved myself to a compliance with the wish that I should take part in this day's ceremony; but I have been sustained by the thought that I should assist by my presence in promoting the accomplishment of his great designs to whose memory the gratitude and affection of the country are now rearing a noble monument, which I trust may yet look down on such a centre of institutions for the promotion of art and science as it was his fond hope to establish here. It is my wish that this Hall should bear his name to whom it have owed its existence, and be called 'The Royal Albert Hall of Arts and Sciences.'"

The report referred to by his Royal Highness was then handed to her Majesty. It is in these terms:—

"May it please your Majesty,—We, the provisional committee appointed by the promoters of the Central Hall of Arts and Sciences, and now acting under your Majesty's Royal Charter of the 8th April, 1867, humbly beg leave to submit to your Majesty the following report of the circumstances which led to the present undertaking, and of the steps we have taken in virtue of the powers entrusted to us.

"After the close of the Great Exhibition of 1851 representations were made to your Majesty's Commissioners for that Exhibition from chambers of commerce, learned societies, and other bodies interested in science or the arts, of the want that was felt throughout the country of a central institution in London for the promotion of scientific and artistic knowledge as applicable to productive industry. Your Majesty's Commissioners, being impressed with these representations, announced in their second report to your Majesty that they had devoted the surplus funds of the Great Exhibition to the purchase of an estate at South Kensington with a view of providing a common centre of union for the various departments of science and art connected with industrial education.

"After the purchase of this estate, numerous plans for effecting the contemplated object were prepared, under the immediate direction of your Majesty's lamented Consort, the president of the Royal Commission, in all of which a central hall formed a prominent and essential feature.

'The untimely death of the illustrious Prince led, in conjunction with other causes, to the suspension of the steps necessary for carrying into effect the comprehensive scheme contemplated by his Royal Highness and your Majesty's Commissioners.

"An advance, however, has been made towards its realisation, by the establishment of the South Kensington Museum, and of the Royal Horticultural Society, on the estate purchased by the Commissioners. A large portion

of the estate has also been made available for purposes connected with the objects of the purchase, by allowing its occupation by the buildings of the International Exhibition of 1862; and a part of those buildings now contain the second of the series of Exhibitions of National Portraits which it is proposed to hold there, besides affording space for a large collection of models of naval architecture.

"It will be in the recollection of your Majesty that the committee named by your Majesty to advise your Majesty on the subject of a national memorial to the Prince Consort, recommended the erection of a hall on this spot as a fitting portion of that memorial, and the Commissioners expressed their willingness to give effect to that recommendation by the grant of a site.

"Designs for a personal monument and a hall of art and science were accordingly submitted to your Majesty. It was found, however, that the available funds would not be sufficient for the execution of the double object, and your Majesty, acting under the advice of the committee, determined to appropriate the whole sum to the one object of the personal monument in Hyde-park now in the course of construction, opposite the site on which the hall is to be erected.

"The intention of constructing the hall, however, was not abandoned; and in the year 1865 many of those who had taken a deep interest in the Great Exhibition of 1851, and in the success of the further plans arising out of it, formed themselves into a committee to consider the readiest mode of obtaining the means of erecting this hall. The Royal commissioners lent their willing co-operation, promising the free grant of a site valued at £60,000, and further agreeing, on certain conditions, to advance the sum of £50,000 towards the cost of the hall.

"On the 6th July of that year a general meeting of the persons interested in the undertaking was held at Marlborough-house, at which we were appointed a provisional committee, with full powers to adopt such measures as might appear to us best calculated to carry the proposed undertaking into effect, his Royal Highness the Prince of Wales accepting the office of president. Your Majesty's gracious patronage was at the same time vouchsafed to the undertaking.

"Acting upon the powers thus conferred upon us, we took steps for obtaining subscriptions, and in the course of last summer the sum subscribed had reached the amount of £112,000. The monetary panic which occurred about that time made it then expedient, in our opinion, to suspend our efforts in this direction.

"The other preliminary steps necessary for the prosecution of the work were, however, actively proceeded with. A design sketched for the hall by the lamented Captain Fowke, was worked out by Lieut.-Colonel Scott, of the Royal Engineers, assisted by the advice of a scientific committee of architects and others, and was finally approved by us.

"At the same time an offer was made by Messrs. Lucas, the eminent builders, and accepted by us, which provided the remaining funds and secured the completion of the building within the original estimate of £200,000.

"The excavation of the foundation was at once commenced, and we felt ourselves in a position to announce to the public the beginning of the work, and to make the application to your Majesty, which met with your Majesty's gracious acquiescence, that your Majesty would be pleased to lay the first stone of the proposed hall in person.

"We beg humbly to submit to your Majesty plans showing both the external elevation and interior arrangement and decoration of the hall.

"We are convinced that by the erection of this central hall we are supplying a great public want, and acting strictly in accordance with the enlightened views of your Majesty's Illustrious Consort, and of the commission of which he was the head.

"It is our grateful duty, in conclusion, to return to your Majesty our humble thanks for the marks of your Royal favour at all times extended to us in connection with this undertaking, for the grant of your Majesty's Royal Charter of Incorporation, for your Majesty's liberal subscription towards the funds of the hall, and for your auspicious presence on this occasion. We would venture to hope that a continuance of your Majesty's support may be vouchsafed to us in the further prosecution of a plan destined, as we confidently trust, to prove of lasting benefit to the interests of science and art, and to add to the enjoyment and instruction of large numbers of your Majesty's subjects."

Her Majesty then left the Throne, and went towards the foundation stone, which was of red polished granite, and bore, in gold letters, the following inscription:—

"This stone was laid
by her Most Gracious Majesty
Queen Victoria,
May 20th, 1867."

The various coins of the realm, and an engrossed scroll, containing a description of the undertaking, having been handed to her Majesty by the Earl of Derby, Lord Granville presented the vase in which they were to be enclosed. The Queen placed the coins and the scroll in the vase, and closed it. By her Majesty's orders Lieut.-Colonel Scott, R.E., director of the works, laid the vase in the cavity. Mr. Lucas, the builder, then presented to the Queen a gold trowel, having first placed some mortar on the four corners of the lower stone. The Queen, after spreading the mortar, gave the word, and the corner stone began to descend into its place, amid a flourish of trumpets and a Royal salute. The Queen, with a plummet and line, tested the accuracy of the block's adjustment, and, striking it with an ivory hammer, declared it "well and truly fixed," amid loud cheering. The Archbishop of Canterbury then offered up a short prayer, and the band and chorus of the Royal Italian Opera performed a composition by the Prince Consort, entitled *L'Invocazione all' Armonia*.

The Hall of which Her Majesty has laid the foundation-stone is to be available for the following objects:—Congresses, both national and international, for purposes of science and art; performances of music; distributions of prizes by public bodies; *conversazioni* for the promotion of science and art; agricultural, horticultural, and industrial exhibitions; and displays of pictures and sculpture.

The central portion of the Hall will be occupied by an arena of 100 ft. long and 65 ft. wide, measured on the diameters of the oval. It is intended to use this arena for an audience during orchestral performances, when it will contain 800 or 900 persons, to be admitted by payment or by tickets granted for the occasion. At other times it will be a promenade, or be used for exhibitions of flowers, sculpture, or the industrial arts. Above and around the arena will rise the amphitheatre, extending over four-fifths of the oval in a gradually increasing curve of ascent. Each step or bench will be three feet wide, and the whole will be seated with comfortable chairs. The freeholds of these sittings are to be sold to subscribers for £100 each sitting. The sittings themselves will be transferable by sale or otherwise, or the right of occupying them may be sold either for a period or any particular occasion. In all, there will be about 1,720 of these amphitheatre sittings, and of these 360 can be converted if necessary into box sittings. The remaining part of the oval will be occupied by sittings for an orchestra of 1,000 performers, and by a very fine organ, to be built by Mr. Willis, the maker of the organ for St. George's Hall, Liverpool. Above the amphitheatre again will rise two tiers of boxes. Those in the lower tier are each to contain ten persons, and are to be sold for £1,000 each; those in the upper tier will contain five persons each, and are to be sold at £500 the box. The boxes will be, like the sittings, transferable, and each of them will be provided with a small room behind it. There will be 43 in the principal tier,

and 86 in the upper. The provisional committee have proceeded on the principle of retaining full powers for the shareholders over those portions of the Hall which can be used for exhibitions or for other purposes connected with the objects of the undertaking. No seats will be sold which in any way interfere with the various purposes for which the hall is intended. Above the boxes will be a corridor, 21 ft. wide, which is to be fitted with movable seating. This arrangement will allow it to be used for a sitting audience, a promenade, or exhibition space. It will give space for seating 2,700 persons. The wall of the corridor may be considered to bound the hall proper, and from wall to wall on the longer diameter of the oval it will measure 230 ft., and on the shorter, 180 ft., which enormous stretch is all to be covered in with a roof in one span, resting on piers, between which the spectator in the hall will see the architectural features of a top-lighted picture gallery and promenade running completely round the hall. This gallery would also be available for a seated audience on great musical festivals, and will conveniently accommodate 1,000 persons. The total number, therefore, that could be conveniently seated in the building will be 8,000, including the orchestra, and if of these the provisional committee have to sell only 2,000, as the statement put forth by them implies, there will be no less than 6,000 sittings for *entrepreneurs* using the hall. From the top of the piers which separate the upper galleries from the main body of the hall the ceiling will rise in an elliptical curve to the great central skylight, both ceiling and skylight being suspended from immense wrought-iron arched ribs or girders. The total height from the floor of the arena to the skylight will be 135 feet. Commencing to work downwards from the upper gallery there will be immediately below it numerous offices, rooms for societies using the hall, and refreshment and promenade rooms, and extending from the general contour of the hall there are to be over the entrances on the one side a lecture theatre, and on the other a small concert room. Below this floor will be the crush rooms, which are to give admittance to the corridors surrounding the boxes, and also to the galleries. Behind the orchestra, at the ground level, and also on a level with the lower tier of boxes, will be long refreshment and promenade rooms. The basement will be occupied with the kitchen, stores, &c., so arranged that the lifts from the kitchen will pass through all the refreshment rooms on the three floors above.

The arena is to contain 800 to 1,000 people. There are to be four staircases on the south-east and south-west side, and two on the north side, or a staircase for every 166 persons. There will be also six staircases to the box tiers, besides an entrance from the conservatory of the Royal Horticultural Society, where there will be two flights of steps, making in all eight staircases for 860 people, or a staircase for every 108 people. To the lower gallery, which will be occupied by persons admitted for comparatively small payment, there are six staircases, 6ft. 6in. wide, for 2,700 persons. The upper gallery is to be provided only with two staircases 6ft. 6in. wide, but space is to be left for additional staircases in case of their being required. The amphitheatre sittings will be entered from the level of the ground in Kensington-road. The means of egress are to be very ample. Counting two entrances to the corridor of the Horticultural Society, from the arena level there are to be no less than 29 exit doors, which assuming the number of persons capable of being collected in the Hall, will be one for every 275 persons. For the refreshment department there will be provision made for dining, if necessary, 1,000 persons; but the kitchen will admit of any extension required, and the hall will give the power of dining in the arena and on the two gallery floors no less than 2,000 persons. It is contemplated that during great choral festivals the conservatory of the Royal Horticultural Society will be lighted and thrown open to visitors to the Hall as a promenade.

PARIS EXHIBITION.

The weather has been as bad here as in London, only two fine days or so during the last fortnight, but the public has fallen into the habit of going to the Exhibition, and, as the weather permits of little promenading in the park and garden, the building itself is at least as well filled as it was during the precociously hot weather which ushered in the month of May. The means of transit from, if not to, the exhibition are still far below the requirements of the public; the trains on the railway are unaccountably few in number, only one per hour during the greater part of the day; the steam-boats are too small, the omnibuses too few, and as to cabs, nothing will induce the drivers to go to the Champ de Mars for a fare when they find them with the greatest ease in the heart of Paris. As usual, in Paris, individual enterprise is not to be depended upon; and although the authorities have had more than one meeting of cab-proprietors, nothing has yet arisen out of them to supply the public want. The only extraordinary effort that has been made is the conversion of a number of very rude vans, with tarpaulin covers, into public conveyances, but they are a mere drop in the ocean of tired pedestrians wearily trying to make their way to the town, where they may recruit their famished bodies at prices more moderate than those of the Exhibition, which are tolerably high, though perhaps not extravagantly so. The great international restaurant has a large number of visitors, but while its position, in the furthest part of the park, is no obstacle in the case of hale men, it is so as regards many other persons, especially after the fatigues of the Exhibition.

For the Exhibition itself, that is to say, the contents of the building, every day brings its importance more and more to light. The juries have completed their examination, and although nothing is yet officially known concerning the awards, it is not too early to point out a few of the novelties, improvements, and examples of excellence, which must have attracted the attention of the juries, as well as of other observant persons. The general progress of science, art, and taste is of course a subject of interest to all the world; but charity begins at home, and it would be mere hypocrisy to pretend that the figure which Great Britain makes in the Exhibition is not uppermost in the minds of Englishmen.

We have already said something on this head in connection with the fine arts and the "Histoire de Travail," or retrospective gallery. It is time now to take a general glance at the industrial portion of the Exhibition, and, for more reasons than one, the great machinery court or gallery of the useful arts claims precedence. And first, as regards machinery in motion, it may be stated that the arrangements for the supply of motive power are on a liberal scale, and Great Britain is better off than her neighbours in one of her specialities, namely steam. Messrs. Galloways, aided by two other boilers, those of Messrs. Heywood and Tyler, and Howard, supply all that is required to keep anything moving that is intended to move during the whole number of hours that the Exhibition is open, while in the other departments an evident economy of power is necessary. When the great machinery court has been carefully examined, it will hardly be said that the importance of the English collection of machinery is unworthy of the nation. The limits of the *Journal* will only permit of a summary notice of the most striking objects, and of short notes even respecting them. At the head of the machinery stand the steam-cranes, which must not be overlooked; they did great service; they enabled the British commission to outstrip all their rivals in getting their portion of this enormous court early into order, and they await the closing day to render like service again. There was, as far as we know, no steam-crane on the ground before those from England arrived, and certainly no other nation made such extensive use of them. Close to them stands a collection of other machinery and apparatus,

very different, indeed, in aspect, but having the same useful object, namely, the rapid despatch of business; these are the models contributed by her Majesty's Post-office, the railway sorting carriages, the ingenious apparatus for picking-up and dropping letter-bags on the lines, and the tables and other arrangements for sorting and stamping the letters. In this department we stand yet completely unrivalled, and the Post-office models are a source of constant admiration. We understand that Prussia has some arrangement for the taking-up of bags *en route*, but we believe that no other country has yet adopted a plan so long in operation, though in its present complete form, in our own country.

Close to the Post-office models stands a case which contains illustrations of another of England's triumphs, during the twelve years that have elapsed since a universal exhibition was held in Paris, namely, the models of the machinery used in the process of making Bessemer steel, which is now adopted more or less all over Europe.

Amongst the first model machines that the visitor encounters in the same part of the gallery are three for mining and tunnelling; one of these is the "iron man," or coal-getting machine of Messrs. Carrett, Marshall, and Co., of Leeds, moved by water power under high pressure, and which works by scoops affixed to a prolonged piston arm; and the machine of Messrs. Jones and Levick for the same process, but in a very different manner, the action being that of an immense pick, with a radial sweep of four or five feet, and worked either horizontally or perpendicularly by a compressed air engine, at the rate of 200 strokes a minute.

The third machine referred to is Capt. Beaumont's rock boring machine and tunnelling machine, also moved by a compressed air engine. This machine is known to engineers, having been used for some time at the Vartry waterworks at Bolton le Moors, but others may be interested to know that it consists of a large wheel, or chuck, armed with 50 powerful chisels, or, as they are technically called, "jumpers," which have a circular and reciprocating motion, caused by the alternate advance and retreat of the piston and axis of the chuck, while a still larger jumper or drill, with an X cutting face, works a hole in the centre. It is said that with about 15-horse power, this machine will cut a circular grove in hard rock to the depth of a foot; when the grove is cut to the depth of 2ft. or 2ft. 6in., the machine is drawn back, powder is placed in the central hole, and the isolated circular pieces of rock blown to pieces.

Near this spot are several steam engines of new or improved construction which must not be overlooked. They include a horizontal engine by Messrs. Donkin, a powerful one by Galloway, an Allen engine by Whitworth, a Corliss engine by Hick, of Bolton, two improved portable engines by Ransome and Sims, and the steam-hawling engine of Baron de Mesnil, made by Fowler.

In this section of the court may be seen in action models of one of the most important tools that has ever been designed, namely, Ramsbottom's patent duplex horizontal steam hammer, manufactured by Messrs. Thwaites and Carbutt, of Bradford. There are only seven of these hammers yet at work, one of 30 tons at Crewe, and six of ten tons in other places, so that this must be regarded as a positively new form of tool. The same firm shows one of the finest pieces of iron workmanship in the exhibition, a wrought-iron stand for a vertical hammer, with balanced piston, for working Bessemer steel.

The working model of a steam pile-driving engine, and a full-sized engine of the same kind, but different model, in the park must not be left unnoticed.

The wood-working machines are numerous in the exhibition; and while the lighter kind differ but little from those of our own friends in this country, where the famous ribbon saw was, we believe, invented, or at any rate first exhibited in 1855, the heavier machines show an immense improvement in the arrangement of their parts and the solidity of their construction; the development of this class of machine tools is a fact which marks the interval between the two Paris Exhibitions.

Since the first Great Exhibition our neighbours have made great strides in the construction of iron working machine tools; but an inspection of those in the present exhibition will not injure the reputation of Great Britain for the production of these most important of all engines except the steam-engine. The show is very large, and almost without exception there is evidence everywhere of improvement—in principle, in detail, and in workmanship; where all is so good it is almost invidious to select one name, but there is in the collection of Messrs. Sharp, Stewart, and Co., a connecting rod completely finished by machines of this kind, which may well be cited as an example of the perfection of the best British tool-making machines. For perfection of workmanship again we must quote the taps and dies and the templates exhibited by Whitworth and Co., and Sharp, Stewart, and Co., not as anything new, but certainly as unsurpassed.

The spinning and weaving machinery in the British side is certainly second to none in the exhibition.

Amongst scientific apparatus must be mentioned the improved revolving lights of the Trinity-house, shown within the machinery court, and the magneto-electric light of Professor Holmes, and his steam fog-horn, worked by condensed air, in the park. The machines used for the magneto-electric light are placed for inspection in a small building at the foot of the scaffolding upon which the light is supported. The fog-horn, every now and then sends its loud but musical notes across the park from the French lighthouse, where it has been hospitably housed; we understand that the French Government has adopted this valuable nautical safeguard.

Besides, further portions of the machinery court are devoted to apparatus of various kinds, and innumerable accessories; and amongst the objects which deserve special notice are the lap-welded and other tubes, joints, coil, and hollow ware of various kinds; railway and other springs, buffers, &c., of which there is a large show by nearly all the great firms.

The show of improved blacklead crucibles, too, is striking, and those of the Patent Crucible Company particularly so, as having, as certificates show, being adopted by nearly all the mints in Europe, including that of Paris; such crucibles used to serve but one heat, now they bear the fierce heat of the gold furnace fifteen or sixteen times.

In telegraphic apparatus England makes a very poor show, but the name of Wheatstone is a host in itself; and Messrs. Siemens have some apparatus and novelties in the way of hollow conical iron posts, for over-ground telegraphs and insulations. But in railway signalling apparatus England certainly stands first. The beautiful model of Messrs. Saxby and Farmer's system of signals in use at the Cannon-street station, exhibited by the maker, has attracted great attention, and the arrangement has been adopted recently for the Belgian lines.

Stoneware and other sanitary apparatus is also largely and admirably represented; while means of preservation of life are represented by a noble lifeboat, three steam and other fire-engines, and a fire-escape, which creates great curiosity. The steam fire-engines have been tried several times, and on one occasion Merryweather's large engine threw a stream of water over the top of the French lighthouse, which is 150ft. high.

In the *Journal* of the 10th instant was given the list of medals awarded in the class of painting; those of the other classes of the Fine Art group have now been announced. In sculpture Mr. Wyon obtains a third-class medal; in architecture, a grand medal is awarded to Mr. Waterhouse; a medal of the first-class to the late Captain Fowke; a second-class medal to Mr. Lynn; and one of the third-class to Mr. Ed. Barry.

In engraving and lithography, England obtains no distinction of any class. Considering that the English engravers exhibiting number nearly fifty, and considering also the high esteem that British engraving enjoys in France, the non-appearance of the name of any English engraver or lithographer in the list of awards is strange.

The analysis of the fine art rewards gives the following result:—

	France. Prizes.	Other countries. Prizes.
Painting	32	35
Sculpture	23	13
Engraving, &c.	8	5
Architecture	12	11

So that, according to the opinion of the international juries, painting is relatively her weakest, and sculpture her strongest, art point.

Colonies.

Communication with Australia.—A conference has been held at Melbourne, consisting of the representatives of the different colonies. It was decided to maintain mail communication with Europe by the three routes, namely, Suez, Panama, and Torres Straits. The preliminary steps to permanently carry out this arrangement will be to memorialize the Imperial authorities to terminate the existing contract with the Peninsular and Oriental Company, and at the same time to ask the Home Government to grant a moiety to be contributed in agreed-to proportions by the different colonies. It is expected that the Torres Straits route will be of great advantage to Queensland, in indirectly helping to open up the northern portions of that vast colony. By the new arrangement on this route it is intended that the mail steamers should sail direct from Singapore, without calling at Batavia, as doing so would involve a loss of two days. Queensland undertakes to light and buoy the straits, and ultimately to extend the telegraph wires to Cape York. When this is done—and it is expected that two years will see its accomplishment—Australia will be placed within twelve days' telegraphic communication with England. Of course the different intercolonial governments will have to endorse the doings of the delegates in Melbourne before any decided action can be taken, but where the advantages are believed to be so obvious it is not expected that any difficulty or delay will occur on this score. It may be added that the sum of £400,000 was agreed upon as a sufficient subsidy to carry out the recommendations of the delegates.

Correspondence.

Mr. Fothergill Cooke's Paper.—Sir,—I beg to correct a slight error in the report of what I said in the discussion on Mr. Cooke's paper, read on Wednesday the 15th inst. I did not speak of "the power of the saws to cut deeper than their semi-diameter," which would be an impossibility; what I intended to convey was that the property in Mr. Cooke's saw, of not decreasing in semi-diameter by wear, was a great advantage. Also, both at pages 424 and 425, the word "Hand saws" should have been printed "Sand saws."—I am, &c.,

R. J. Lecky.

The Collinge Engineering Works,
190, Westminster-bridge-road, May 20th, 1867.

The Food Committee.—Sir,—A gentleman who gave evidence before the Food Committee on the 17th April, states that the cattle in Australia are in best condition for slaughtering during the hot weather, when it is difficult to cure the meat; and that if the cattle were killed in the winter, the meat would be in such a thin and lean condition that it would not be acceptable in this country. I think want of local knowledge has led this witness a little astray. During a residence of upwards of 20 years in Queensland and New South Wales, engaged the whole of that time in the active management of large cattle stations, I have always found cattle to be in their best condition in May, June, July, and August, these being the four coolest months of the year. The reason is obvious; the grass is in the best fattening condition from January to June, and of course the cattle are in their prime as the grass begins to go off; in other words, after they have derived all the benefit they can from the luxuriant pasture. As to meat preserved in canisters "producing dysentery from the effect of certain gases generated in the canisters," I suspect the fact is, that if meat on the verge of decomposition is packed in canisters, it will undoubtedly produce dysentery, and so it would if it had been eaten without being packed in canisters. If the meat is perfectly fresh when it is hermetically sealed, there need be no fear of dysentery, or any "hurtful gases being generated." At the Australian Meat Company's preserving establishment the beef is hermetically sealed, and the whole operation concluded within twenty-four hours from the time the bullock is slaughtered.—I am, &c., The Manager of the Australian Meat Company.

137, Houndsditch, London.

MEETINGS FOR THE ENSUING WEEK.

Mon.....R. Geographical, 1. Annual Meeting.
Tues ...R. Medical and Chirurgical, 8½
Civil Engineers, 8. President's Annual Conversazione.
Royal Inst., 3. Prof. Miller, "On Spectrum Analysis."
Wed ...Society of Arts, 8. Mr. J. B. Denton, "On the Water Supply of the Metropolis in relation to the Conservancy of the Thames and its tributaries, and the demands of the Water Companies."
Thur ...Antiquaries, 8½.
Royal Inst., 3. Prof. Huxley, "On Ethnology."
London Inst., 7. Prof. Bentley, "On Botany."
Philosophical Club, 6.
Fri .....Royal Inst., 8. Mr. T. S. Hunt, "On the Chemistry of the Primæval World."
R. United Service Inst., 3. Colonel R. A. Shafto Adair, "Communications, Military and Commercial, between the Steppes of Central Asia and Hindustan."
Sat .....R. Botanic, 3¾.
Royal Inst., 3. Prof. Huxley, "On Ethnology."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 15th May, 1867.

147. Bill—Army Enlistment.
148. ,, Army Reserve.
149. ,, Militia Reserve.
73. (iv.) Railway and Canal Bills—Fifth Report.
271. East India (Mysore)—Return.
284. Cattle Plague—Return.
290. Navy—Revised Estimate for Vote 10 (Naval Stores, &c.).
Railways—Report of Commissioners.
Education (Scotland)—Second Report of Commissioners.
Public General Acts—Cap. 17 and 18.
Public Petitions—Twenty-second Report.

Delivered on 16th May, 1867.

145. Bill—Courts of Law Officers (Ireland).
159. Tithe Commutation—Returns.
274. National Portrait Gallery—Tenth Report.
277. Tenements, &c. (Ireland)—Returns.
279. Ramsgate Harbour—Statement.

Delivered on 17th May, 1867.

150. Bill—Landed Property Improvement and Leasing (Ireland).
238. Criminal Offenders (Scotland)—Abstract.
244. County Courts—Return.
246. Foreign Sugar—Return.
247. Sugar, &c.—Return.

Delivered on 18th May, 1867.

132. Bill—Judgment Debtors (amended).
133. ,, Bankruptcy Acts Repeal (amended).
131. ,, Bankruptcy (amended).
146. ,, Representation of the People (Scotland).
155. ,, Vice Admiralty Courts Act Amendment.
52. East India (Home Accounts)—Return.
72. Malt and Barley—Returns.
73. Malt and Beer—Return.

285. Law and Chancery Commission—Report.
288. East India (Civil Service Examinations)—Return.
289. East India (Mutiny Prize Money)—Return.
Public Petitions—Twenty-third Report.

Delivered on 20th May, 1867.

153. Bill—Lis pendens.
154. ,, Judges' Chambers (Despatch of Business).
223. Courts of Law, &c.—Return.
258. East India (Progress and Condition)—Statement.
296. Army (Manufacturing Departments)—Return.
297. Army (Shot and Shell)—Returns.
302. Railways—First Report from the Select Committee.
Railways—Minutes of Evidence taken before the Commissioners (March, 1865, to May, 1866).

Patents.

From Commissioners of Patents' Journal, May 17th.

GRANTS OF PROVISIONAL PROTECTION.

Alcohol, &c.—1288—J. F. Collins.
Axles, rails, &c.—1244—G. Severn.
Bobbins—1236—E. T. Hughes.
Boilers—1005—J. Ogden and J. Stephenson.
Boilers—1237—P. J. J. Allibert.
Boots and shoes—1240—E. Waterman.
Boots and shoes—1266—J. H. Johnson.
Brakes—1111—A. A. Langley.
Bricks—1147—W. Kirrage.
Buckets—1235—J. Bird.
Buffalo horn, preparation of—1159—J. B. Roby.
Buildings for horticultural uses—1268—S. Newington.
Buttons—1214—G. A. Huddart.
Cartridges—1117—J. W. Cochran.
Cartridges—1173—J. Plews.
Cartridges—1216—L. B. Bruen.
Cartridges—1231—C. E. Brooman.
Colours, manufacture of—1151—T. V. Lee and C. E. Lankester.
Cooking apparatus—1191—T. South.
Cords, &c., elastic—1133—A. Turner.
Cotton gins—1215—W. E. Newton.
Cotton, gun—1129—E. C. Prentice and T. Richardson.
Designs upon fabrics—1182—J. Brickles, J. S. Jackson, and W. S. Berry.
Doors—1062—F. Waller.
Drying process—1195—G. Gordon.
Easels—1073—R. Day.
Fibrous materials, spinning, &c.—1131—S. Shore.
Fibrous materials, treating—1207—J. W. Burton.
Fibrous substances, spinning—1223—J. Speight.
Fibrous substances, winding, &c.—1241—J. Combe.
Fire-arms, breech-loading—1143—E. Lindner.
Fire-arms, breech-loading—1163—J. W. Cochran.
Fire-arms, breech-loading—1167—J. Needham.
Fire-escapes—1139—J. Scott.
Fires, igniting—1149—J. McKechnie.
Floors, fireproof—1220—D. Birkett.
Floors, &c., fireproof—1270—J. Thomlinson.
Fluids, regulating supply of—1199—C. E. Wetton and W. Galsworthy.
Flux for welding, &c.—1264—J. H. Johnson.
Fret-sawing machine—1246—R. and R. W. Booth.
Furnaces—1227—J. Swinburne.
Gas burners—227—W. H. Stallard.
Gas burners—1024—F. A. Mocquard.
Gases, &c., regulating pressure of—1217—G. Pollard.
Hammers—1067—J. H. Johnson.
Hats—247—J. H. Brown and W. Bull.
Hoists—1226—W. Crooke and T. Wrightson.
Hops, apparatus for training—203—H. Boys.
Horse-shoes—1119—W. R. Lake.
India-rubber, &c., cutting—1193—F. Crossley.
Lamps, securing—195—W. Burley.
Life-boats—1211—A. M. Clark.
Looms—1109—R. L. Hattersley.
Looms—1175—D. Whittaker and B. Croasdale.
Looms—1205—E. G. Fitton and S. Dear.
Looms—1252—G. Hodgson.
Lubricators—1224—J. W. Lowther.
Magneto-electric machines—1210—J. H. Johnson.
Manure—1104—C. G. Gillyatt.
Manure—1229—E. Guenin.
Manures—1243—T. and T. L. G. Bell.
Match boxes, &c.—1250—G. Davies.
Mattrasses, &c.—1258—W. E. Gedge.
Minerals, apparatus for breaking down—1137—W. Cochrane.
Motive-power engines—1225—T. Paton.
Motive-power engines—1300—J. Ramsbottom and T. M. Pearce.
Needle-cases—1260—R. Young.
Nuts, screw—1292—A. M. Clark.
Oakum—1121—J. E. Hodgkin.
Packing for boxes—1234—G. Davies.
Paint, &c., mixing—1185—J. Smalley and S. Bridge.
Paper—1171—C. T. and E. Hook.
Pipes, smoking—1141—E. Wolf.
Presses—681—A. Millar.
Printing machines—1115—W. Clark.
Pumping engines—1181—A. V. Newton.
Pumps—1123—G. Simpson.
Rakes, horse—1157—E. Howell and T. Hardy.
Safety-valves—1284—T. Wood.
Screens, revolving—1282—C. Dutton.
Seeds, &c., separating—1125—E. B. and J. P. Nunn.
Sewing machines—1286—J. Stuart and J. H. Smith.
Signals, &c., railway—1221—J. Cariss.
Silk, preparation of raw—1294—J. H. Johnson.
Sofas, &c.—1228—J. Taylor.
Spray producer—1222—J. Dewar.
Staircases—1278—C. H. Collette.
Steam engines—1203—J. Millward.
Storm-signals—1262—H. A. Clum.
Sugar—1254—A. M. Clark.
Sugar machines—1177—W. R. Lake.
Sugar, refining—1179—W. R. Lake.
Tapes, &c., making up—1242—R. Smith and M. B. Westhead.
Taps, measure—1248—R. W. Ridley and J. Withers.
Telegraphs—1213—W. Clark.
Tents—1209—J. Archibald.
Tickets, apparatus for issuing—1183—J. Haworth.
Velocipedes—1161—W. G. Crossley.
Walls, &c., coverings for—983—J. Mahler.
Weaving machinery—1290—C. Chevron.
Weavings, narrow—1187—T. Tivey.
Wire, galvanizing—1169—W. E. Gedge.
Yarns—1135—J. W. Dalby and G. O. Chapman.
Yarns—1233—J. F. Lawton.
Yarns, &c., warping—1232—T. Watson.

PATENTS SEALED.

3029. J. Bernard.
3042. C. D. Abel.
3045. E. Thomas.
3057. J. Brindley.
3060. E. Morewood.
3066. P. R. M. Le Guen.
3069. J. Berry, J. B. Turner, and C. Vickerman.
3071. J. H. Johnson.
3076. M. Marks.
3114. W. Clark.
3178. W. H. Harfield.
3197. T. Bridges and J. Bigwood.
3212. P. E. De Wissocq and L Krasinski.
3253. W. E. Newton.
3360. W. R. Lake.
3408. A. V. Newton.
199. G. Haseltine.
233. A. Donnet.
470. G. Haseltine.
533. G. Haseltine.
560. S. B. Allen & J. H. Winsor.
590. E. Thring.
755. W. R. Lake.

From Commissioners of Patents' Journal, May 21st.

PATENTS SEALED.

3010. C. E. Brooman.
3083. R. Potter.
3084. J. Coulson.
3085. F. Tyerman.
3088. F. R. A. Glover.
3093. J. Mitchell & W. C. Laird.
3094. R. B. Jones.
3095. W. Bass.
3096. W. B. Johnson.
3097. J. K. Leather.
3099. C. H. Southall, R. Heap, and J. Tasker.
3105. W. R. M. Thompson.
3109. W. Taylor.
3111. T. J. Barron.
3115. J. H. Johnson.
3122. T. Dickins, H. Heywood, and J. Holland.
3124. W. Clark.
3128. R. Norfolk.
3136. L. A. Fargon.
3145. W. Brookes.
3155. P. McGregor.
3175. F. Volkmann.
3176. A. Hermann and H. Brethauer.
3187. F. Kohn.
3203. T. J. Chubb.
3206. J Barwick and S. Tindall.
3289. A. V. Newton.
3432. G. Payne.
5. M. Henry.
351. W. Clark.
651. W. H. Towers.
798. E. L. Sturtevant.
838. G. T. Bousfield.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

1240. J. Fletcher.
1247. P. Bawden and J. and S. Williams.
1270. J., E. G., & C. H. Freeman.
1277. W. Tasker.
1232. J. Womersley.
1264. J. Combe & J. H. Smalpage.
1285. C. P. Coles.
1290. G. T. Bousfield.
1293. J. Adams.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

1195. J. Higgins and T. S. Whitworth.
1198. J. Denis.
1313. J. H. Johnson.
1266. W. Clissold.
1289. W. E. Newton.
1290. J. Paddon and W. Lowther.
1347. W. H. Harfield.

Registered Designs.

4857—April 25—Reliance letter box—P. T. Hendry, 8, Dixon-street, Glasgow.
4858—May 11th—A sash pulley—G. A. Young, 34, Eagle-street, Holborn.
4859—May 18th—Smoke consumer—W. Kitchen, Bowman-lane Dye Works, Leeds.

Journal of the Society of Arts.

FRIDAY, MAY 31, 1867.

Announcements by the Council.

It is with deep regret that the Council have to record the death of their Chairman, Sir Thomas Phillips, Q.C., on Sunday last, the 26th inst.

In consequence of this event, the Society's Ordinary Meeting, fixed for Wednesday evening last, was postponed by order of the Council.

Ordinary Meetings.

Wednesday Evenings at Eight o'Clock :—

June 5.—"On the Water Supply of the Metropolis in relation to the Conservancy of the Thames and its tributaries, and the demands of the Water Companies." By J. Bailey Denton, Esq.

Annual Conference.

The Sixteenth Annual Conference between the Council and the Representatives of the Institutions in Union and Local Boards will be held on Wednesday, the 19th June, at Twelve o'clock, noon. The Right Hon. Henry Austin Bruce, M.P., will preside.

The Council will lay before the Conference the Secretary's Report of the Proceedings of the Union for the past year, and the Results of the Examinations, as well as the Programme of Examinations for 1868.

Secretaries of Institutions and Local Boards are requested to send, as soon as possible, the names of the Representatives appointed to attend the Conference, and early notice should be given of any subjects which Institutions or Local Boards may desire their Representatives to introduce to the notice of the Conference.

Secretaries of Institutions are requested to forward *at once* by book post, copies of the last Annual Reports of their Institutions.

Artizans' Visits to Paris.

The Council of the Society of Arts, feeling the importance of promoting the intelligent study of the Paris Exhibition and the manufacturing establishments in France by artisans of the United Kingdom, have appointed a Committee in furtherance of this object, and on their recommendation, have passed the following minute:—

At the last and former International Exhibitions held in this country, arrangements were made by the French Government, to facilitate the visits of skilled artizans, and interesting reports on the exhibitions were made by them to their government. Believing that such visits on the part of skilled workmen to these great international displays not only exercise a beneficial influence upon the men themselves, but also upon the progress of industry in the country to which they belong, the Council of the Society of Arts have resolved to raise a fund to be employed, in aiding a limited number of English workmen to proceed to Paris for the purpose of studying the present French Exhibition.

To carry this object into effect, they have agreed on the following plan :—

1st. That a number of selected workmen (the number to depend on the amount of funds at the disposal of the Council) shall be assisted to proceed to and remain in Paris a sufficient time (say three weeks), for the purpose of making a careful study of the exhibition, and of such factories and workshops as they may desire to visit.

2nd. That every man so assisted shall, on his return, make a report to the Society of what he has observed during his stay, in reference to the special industry in which he is engaged, and that it be made a condition of the grant to each man that one-third of the amount be retained until his report shall be supplied to the Society.

3rd. The Council think it will be undesirable to fix the exact time for, or to prescribe the duration of, these visits, or to interfere with any of the arrangements the men may desire to make for their own accommodation; but, in order that they may take advantage of the facilities provided by the Commission organised by the French Government for the study of the exhibition, the men will be placed in communication with that Commission on their arrival in Paris.

4th. A considerable sum will be required satisfactorily to accomplish the important object undertaken by the Society, and, in order to raise these funds, the Council have determined to appeal to the members of the Society, who must be interested in the successful results of this movement, in the belief that they will not hesitate to join in a subscription for the furtherance of the undertaking; and they propose at the same time to communicate with the various Chambers of Commerce, inviting their counsel and support. The Council have decided to commence the subscription by a vote of one hundred guineas from the funds of the Society.

Members are invited to aid the Council in this undertaking by subscriptions, which should be forwarded to the Financial Officer at the Society's house.

His Royal Highness the Prince of Wales, President of the Society, has presented a donation of Thirty Guineas.

Subscriptions.

The Lady-day subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

FINAL EXAMINATION, 1867.

PRIZES AND CERTIFICATES AWARDED TO CANDIDATES.

PRIZES.

HIS ROYAL HIGHNESS THE PRINCE CONSORT'S PRIZE OF TWENTY-FIVE GUINEAS TO

951—William Meadows, aged 19, of the City of London College, clerk, who, in this and the three preceding years, has obtained the following First-class Certificates:—

1864. Chemistry—First-class Certificate, with First Prize.
,, Animal Physiology—First-class Certificate, with First Prize.
,, Geometry—First-class Certificate, with First Prize.
1865. Book-keeping—First-class Certificate.
1866. Navigation and Nautical Astronomy—First-class Certificate, with First Prize.
,, Principles of Mechanics—First-class Certificate, with First Prize.
,, Algebra—First-class Certificate.
1867. Arithmetic—First-class Certificate, with Second Prize.
,, Domestic Economy—First-class Certificate, with First Prize.
,, English Literature—First-class Certificate, with First Prize.
,, Mensuration—First-class Certificate, with First Prize.

Arithmetic ...	1st Prize	£5	To No. 1278—Richard Henry Barrett, 18, Portsmouth Dockyard School, engineer student
	2nd Prize	3	,, 951—William Meadows, 19, City of London College, clerk
			No Prize for Females awarded ‡
Book-keeping	1st Prize	5	,, 823—John Butler, 26, Leeds Church Institute, railway clerk
	2nd Prize	3	,, 850—Robert Archer Furbank, 22, Leeds Mechanics' Institution, savings' bank clerk
			No Prize for Females awarded. ‡
Algebra	1st Prize	5	,, 434—Edmund Felix Mondy, 21, Deptford Local Board, shipwright
	2nd Prize	3	,, 127—Daniel Welwood, 17, Belfast Academy, clerk
Geometry ...	1st Prize	5	,, 118—William Whitford, 22, Belfast Academy, flaxdresser
			No Second Prize awarded *
Mensuration..	1st Prize	5	,, 951—William Meadows, 19, City of London College, clerk
	2nd Prize	3	,, 384—John Henry Morrison, 21, Chatham, &c., Mechanics' Institution, shipwright
Trigonometry	1st Prize	5	,, 1268—Thomas Edwards, 18, Pembroke Dock Mechanics' Institution, shipwright (apprentice)
			No Second Prize awarded *
Conic Sections	1st Prize	5	,, 1286—Henry Palmer, 21, Portsmouth Local Board, shipwright
	2nd Prize	3	,, 434—Edmund Felix Mondy, 21, Deptford Local Board, shipwright
Navigation & Nautical Astronomy	.....	...	*No Prizes awarded* †
Principles of Mechanics...	1st Prize	5	,, 1278—Richard Henry Barrett, 18, Portsmouth Dockyard School, engineer student
	2nd Prize	3	,, 464—Alfred Morcom, 18, Devonport Mechanics' Institute, naval engineer student
Practical Mechanics	1st Prize	5	,, 461—Francis Ford, 19, Devonport Mechanics' Institute, engineer student
	2nd Prize	3	,, 1578—William H. Stanier, 17, Wolverhampton Ath., railway clerk
Electricity & Magnetism..	.....	...	*No Prizes awarded* †
Light & Heat	1st Prize	5	,, 973—William Vaughan, 26, City of London College, clerk
			No Second Prize awarded *
Chemistry.....	1st Prize	5	,, 720—William Henry Wood, 18, Halifax Working Men's College, clerk
	2nd Prize	3	,, 719—James William Davis, 23, Halifax Working Men's College, blue dyer
Mining and Metallurgy..	.....	...	*No Prizes awarded* †
Botany	1st Prize	5	,, 1347—Robert Creaser Kingston, 20, Richmond Parochial Library and Reading Room, gardener
			No Second Prize awarded *
Floriculture...	1st Prize	5	,, 1347—Robert Creaser Kingston, 20, Richmond Parochial Library and Reading Room, gardener
	2nd Prize	3	,, 274—William Pritchard Roberts, 27, Bromley Literary Institute, gardener

* No other First-class Certificates were given in these subjects, or the Candidates were disqualified for receiving Prizes.
† No First-class Certificates were awarded in any of these subjects.
‡ No Female Candidate qualified to receive Prizes obtained a First-class Certificate in any of these subjects.

Fruit & Vegetable Culture	1st Prize	£5	,,	1467—John Charles Higgs, 26, Southampton Athenæum, gardener
	2nd Prize	3	,,	1439—George Stanton, 26, Slough Mechanics' Institute, gardener
Animal Physiology	1st Prize	5	,,	1050—William John Wilson, 24, Roy. Polyt. Inst., engineer's clerk
	2nd Prize	3	,,	1065—George Frederick Downar, 22, Roy. Polyt. Inst., clerk
				No Prize for Females awarded ‡
Domestic Economy	1st Prize	5	,,	951—William Meadows, 19, City of London College, clerk
	2nd Prize	3	,,	1050—William John Wilson, 24, Royal Polytechnic Institution, engineer's clerk
	Female Prize	2	,,	1554—Mary Ann Aingworth, 18, Messrs. Bagnall's Girls' Evening School, Gold's-hill, domestic
Political and Social Economy	.....	...		*No Prizes awarded* †
Geography	1st Prize	5	,,	934—James Frederick Ellis, 19, City of London College, lithographer
	2nd Prize	3	,,	954—Hugh Morgan, 20, City of London College, clerk
				No Prize for Females awarded ‡
English History	1st Prize	5	,,	1473—Edward T. Sims, jun., 19, Southampton Athenæum, clerk
	2nd Prize	3	,,	984—William Burgoyne, 20, London Mechanics' Institution, clerk
	Female Prize	2	,,	1010—Martha Smith, 21, London Mechanics' Institution
English Literature	1st Prize	5	,,	951—William Meadows, 19, City of London College, clerk
	2nd Prize	3	,,	598—Sydney Wentworth Young, 21, Glasgow Athenæum, commercial clerk
				No Prize for Females awarded ‡
Logic & Mental Science	.....	...		*No Prizes awarded* †
Latin&Roman History	.....	...		*No Prizes awarded* †
French	1st Prize	5	,,	613—William Mowat, 17, Glasgow Athenæum, clerk
	2nd Prize	3	,,	594—John S. Macdougall, 18, Glasgow Athenæum, clerk
				No Prize for Females awarded ‡
German	1st Prize	5	,,	940—James Staughton Harding, 27, City of London College clerk
	2nd Prize	3	,,	935—Francis Brandt Evans, 19, City of London College, clerk
				No Prize for Females awarded ‡
Italian	.....	...		*No Prizes awarded* †
Spanish	1st Prize	5	,,	768—William Henry Dyson, 25, Huddersfield Mechanics' Institution, waste dealer
				No Second Prize awarded *
				No Prize for Females awarded ‡
Free Hand Drawing	1st Prize	5	,,	1047—Joseph Harris, 22, Royal Polytechnic Institution, draughtsman
	2nd Prize	3	,,	1363—Henry Edward Gilbert, 22, Rugby Institute, solicitor's clerk
				No Prize for Females awarded ‡
Geometrical Drawing	1st Prize	5	,,	11—John Coulson Nicol, 19, Aberdeen Mechanics' Institution, architect
	2nd Prize	3	,,	1151—William Carter, 18, Manchester Mechanics' Inst., engineer
				No Prize for Females awarded ‡
Theory of Music	1st Prize	5	,,	530—Robert Anderson, 40, Popular Evening Classes, Andersonian University, Glasgow, house-factor
	2nd Prize	3	,,	1463—James Henry Allcott, 23, Southampton Athenæum, custom's officer
				No Prize for Females awarded ‡

The Royal Horticultural Society's Prizes are awarded as follows :—

In Botany	1st Prize	£5	To No. 1347—Robert Creaser Kingston, 20, Richmond Parochial Library and Reading-room, gardener
	2nd Prize	3	,, 1350—Richard Lee Keenan, 23, Richmond Parochial Library and Reading-room, gardener
			No other Candidate qualified to receive a Prize.
In Floriculture	1st Prize	5	,, 1347—Robert Creaser Kingston, 20, Richmond Parochial Library and Reading-room, gardener
	2nd Prize	3	,, 274—William Pritchard Roberts, 27, Bromley Literary Institute, gardener
In Fruit and Vegetable Culture	1st Prize	5	,, 1467—John Charles Higgs, 26, Southampton Athenæum, gardener
	2nd Prize	3	,, 1439—George Stanton, 26, Slough Mechanics' Institute, gardener

The *Gardeners' Chronicle* Prize of £3 is awarded to—

No. 1347—Robert Creaser Kingston, 20, Richmond Parochial Library and Reading-room, gardener

* No other First-class Certificates were given in these subjects, or the Candidates were disqualified for receiving Prizes.
† No First-class Certificates were awarded in any of these subjects.
‡ No Female Candidate qualified to receive Prizes obtained a First-class Certificate in any of these subjects.

The Royal Geographical Society's Prize of £5 is awarded to—

No. 734—James Frederick Ellis, 19, City of London College, lithographer—1st class Certificate in Geography, with the highest number of marks

The Worshipful Company of Coach and Coach-Harness Makers' Prize of £3 is awarded to—

No. 393—Henry Potter, 17, Chelmsford Literary and Mechanics' Inst., coach-painter—2nd class Certificate in Free-hand Drawing, with the highest number of marks obtained, in that subject, by a Candidate employed in the Coach-making trade

The Worshipful Company of Goldsmiths' Prizes are awarded as follows:—

1st Prize, £5—to No. 125—James Rowan, 16, Belfast Academy, goldsmith and jeweller—1st class Certificate in Arithmetic, with the highest number of marks obtained by a worker in the precious metals

2nd Prize, £3—to No. 1038—Thomas George Johnson, 17, Roy. Polyt. Inst., silversmith—3d class Certificate in Arithmetic, with the second highest number of marks obtained by a worker in the precious metals

CERTIFICATES.

The following is an Alphabetical List of the Candidates who have obtained Certificates:—

The numbers following the names give the ages of the Candidates.

(1st) after a subject signifies a First-class Certificate.
(2d) " " Second-class "
(3d) " " Third-class "

(The occupations stated are either present or proposed.)

915—Abbott, Thomas, 18, City of Lond. Coll., clerk—German (2d)
259—Ackland, James, 16, Bristol Trade School, ironmonger—Chem. (3d)
669—Adam, John, 21, Glasgow M.I., mason—Bkpg. (1st); Alg. (2d)
1267—Adam, Joseph, 19, Paisley Artiz. Inst., warehouseman—Arith. (2d); French (3d)
527—Adamson, David, 27, Pop. Evg. Classes, And. Univ., Glasgow, iron turner—Music (2d)
1142—Agnew, Hugh, 16, Manchester M.I., cost clerk—Bkpg. (2d)
1554—Aingworth, Mary Ann, 18, Messrs. Bagnall's Girls' Evg. School, West Brom., domestic—Dom. Econ. (1st), with prize of £2.
717—Akroyd, Joseph, 19, Halifax W.M. Coll., wire drawer—Arith. (3rd); Bkpg. (2d)
129—Alderson, Emily, 29, Birm. and Midld. Inst., daily governess—German (2d)
128—Alderson, Louisa, 31, Birm. and Midld. Inst., daily governess—Eng. Lit. (3d)
1060—Aldridge, Louise B., 18, Roy. Polyt. Inst.—French (3d)
1265—Alexander, William M., 27, Paisley Artiz. Inst., archit. surveyor's assistant—Bkpg. (2d)
1463—Allcott, James H., 23, Southampton Ath., Customs' officer—Music (1st), with 2nd prize.
860—Allen, Edmund T., 27, Leeds Y. Men's Christian Assoc., draper's assistant—Bkpg. (3d)
664—Anderson, Archibald, 22, Glasgow M.I., clerk—Arith. (2d)
1471—Anderson, Archibald R., 20, Southampton Ath., engineer's draughtsman—Arith. (2d); Navigation, &c. (3d)
529—Anderson, Coll, 16, Pop. Evg. Classes, And. Univ., Glasgow, clerk—Arith. (3d)
530—Anderson, Robert, 40, Pop. Evg. Classes, And. Univ. Glasgow, house-factor—Music (1st), with 1st prize
1251—Andrew, John, 20, Paisley Artizans' Inst., engineer (apprentice)—Arith. (2d)
1162—Andrew, Watts, 18, Mossley M.I., warehouseman—Bkpg. (3d)
1269—Angel, Thomas, 23, Pembroke Dock M.I., shipwright—Arith. (2d); Bkpg. (3d)
1643—Annis, Samuel, 36, St. Thomas' Schools, Woolwich, engineers' pattern maker—Geom. Dwg. (3d)
1126—Appleby, William, 20, Manchester M.I., clerk—Bkpg. (2d)
890—Appleton, Charles, 18, Liverpool Inst., clerk—Bkpg. (3d)
917—Appleyard, Charles H., 30, City of London Coll., traveller—Bkpg. (1st)
1207—Armitage, John, 16, Oldham Lyceum, pattern-maker—Geom. Dwg. (2d)
1108—Armitt, Anna Maria, 17, Manchester M.I., teacher—French (1st)
381—Armstrong, John, 17, Carlisle M.I., clerk—Arith. (1st); Eng. Hist. (2d); Mens. (2d)
1402—Arnold, Alfred, 20, Salford W.M. Coll., clerk—Arith. (3d)
131—Atkins, Alfred H., 20, Birm. and Midl. Inst., schoolmaster—Alg. (1st)
41—Auchinvole, Alexander, 29, S.E.Ry. Mech. Inst., Ashford, tin-plate worker—Eng. Lit. (3d)
1509—Axon, Hiram, 18, Stockport M.I., clerk—Geom. Dwg. (3d)

991—Backhouse, Elizabeth D., 19, London M.I., no occupation—Eng. Hist. (2d)
449—Bagley, William F. G., 25, Devonport M.I., accountant—Arith. (2d)
481—Baguley, Matthew, 20, Droylsden Educ. Inst., bookkeeper—Arith. (2d); Chem. (3d); Geog. (1st)
82—Bailey, David, 32, Bilston Inst., schoolmaster—Eng. Lit. (1st); Music (3d)
1245—Bailey, Stanley, 20, Henshaw-street Mutual Imp. Soc., Oldham, self-actor minder—Arith. (3d)
257—Bailey, Thomas, 26, King-square Inst., Bristol, warehouseman—Arith. (3d)
866—Bailye, Thomas, 20, Lichfield W. Men's Assoc., attorney's writing clerk—Free-hd. Dwg. (3d)
532—Ballantyne, William L., 18, Pop. Ev. Classes, And. Un., Glasgow, clerk—Anim. Phys. (3d)
712—Bairstow, Uriah, 20, Halifax W.M. Coll., clerk—Arith. (1st); Bkpg. (1st)
450—Banker, Stewart M., 21, Devonport M.I., telegraph clerk—Alg. (2d); Bkpg. (2d); Arith. (3d); Princ. Mech. (3d)
416—Banks, William, 17, Clitheroe M.I., pupil-teacher—Arith. (2d)
75—Barker, Jane, 16, Bacup M.I., weaver—Dom. Econ. (2d)
911—Barker, John, 24, Lomeshaye Evg. Sch., clerk—Light and Heat (3d)
1274—Barker, Miles, 24, Swinton Inst., cotton-mill clerk—Alg. (2d); Trigon. (3d); Bkpg. (3d)
107—Barklie, Robert, 28, Belfast Acad., teacher—Alg. (1st); Chem. (2d); Geom. (2d)
170—Barlow, James, 23, Bolton M.I., commercial traveller—Eng. Lit. (2d)
1302—Barnes, Henry, 20, Preston M.I., house painter—Free-hd. Dwg. (2d)

918—Barnes, William H., 26, City of Lond. Coll., clerk—Arith. (1st)
1493—Barrett, John, 21, Stockport M.I., weaver—Arith. (3d)
1278—Barrett, Richard H., 18, Portsmouth Dockyard Sch., engineer student—Arith. (1st), with 1st prize; Alg. (1st); Princ. Mech. (1st), with 1st prize
1141—Barrie, Frederick H., 17, Manchester M.I., pattern card maker—Free-hd. Dwg. (3d)
35—Bartholomew, Henry, 17, Aldershot Local Board, draper's assistant—Free-hd. Dwg. (2d)
314—Bartlett, Henry G., 23, Burrage-road Sch., Plumstead, ship joiner—Geom. Dwg. (3d)
692—Bates, John D., 20, Halifax M.I., woolsorter—Bkpg. (1st)
865—Batkin, William, 16, Lichfield W. Men's Inst., teacher (National Sch.)—Arith. (3d)
1025—Batters, John, jun., 18, Lond. M.I., clerk—Arith. (3d); Bkpg. (3d)
1104—Battersby, Nathaniel, 19, Manch. M.I., clerk—Bkpg. (3d)
697—Baxendale, John W., 20, Halifax M.I., warehouseman—Bkpg. (1st)
1279—Baxter, Benj. J. 18, Portsmouth Dockyard Sch., engineer-student—Arith. (1st); Alg. (2d); Geom. (3d)
608—Baxter, Wm., 18, Glasgow Ath., clerk—French (3d)
451—Bayly, John, 30, Devonport M.I., shipwright—Mensur. (2d)
1140—Beckett, William F., 17, Manch. M.I., clerk—Arith. (3d)
1553—Beckwith, Mary Ann, 17, Messrs. Bagnall's Schs., W. Bromwich, pupil-teacher—Dom. Econ. (1st)
1462—Beer, Henry, 17, Southampton Ath., clerk—Arith. (2d); Bkpg. (2d)
1464—Beer, Thomas, 27, Southampton Ath., agent's clerk—Elect. and Mag. (2d); Music (3d); Prac. Mech. (3d)
1527—Beesley, William T., 28, Stocksbridge Mut. Imp. Soc., cold steel roller—Bkpg. (3d)
1661—Bell, George, 20, York Inst., bricklayer—Geom. Dwg. (2d); Free-hd. Dwg. (3d)
996—Bell, George, 24, Lond. M.I., inspector of waterworks—Geom. Dwg. (3d); Free-hd. Dwg. (2d)
1063—Bell, Wilhelmina J. M., 20, Royal Polyt. Local Board—Dom. Econ. (1st); Arith. (3d)
1577—Bennett, Eva E., 16, Wolverhampton Ath., articled pupil—Arith. (2d); Geog. (3d)
818—Bennett, John, 25, Kinver Young Men's Inst., rate collector—Arith. (2d)
893—Bennett, William, 19, Liverpool. Inst., provision dealer—Arith. (3d)
1102—Bennion, John A., 17, Manchester M.I., draftsman Geom. Dwg., (2d); Prac. Mechan. (2d)
1535—Bentley, James, 18, Tottington Mut. Imp. Soc., machine printer—Arith. (2d)
1693—Berry, Edward, 17, Stroud Institution, grocer—Arith. (3d)
1169—Berry, Thomas, 18, Mossley M.I., cotton-piecer—Bkpg. (3d)
475—Bertenshaw, George, 18, Droylsden Educ. Inst., hatter—Geom. Dwg. (3d)
1356—Betts, Frank, 16, Rugby Inst., solicitor's clerk—Arith. (2d)
42—Biggar, William, 23, S.E. Railway M.I., Ashford, engine fitter—Arith. (1st)
22—Bilsborough, James, 35, Alderley Edge Inst., whitesmith—Dom. Econ. (3d)
597—Binnie, James, 22, Glasgow Ath., book-keeper—Eng. Hist. (2d); French (2d)
1391—Birchby, William, 16, Salford W.M. Coll., pupil teacher—Arith. (1st); Chem. (3d)
1528—Bird, Joseph, 21, Stourbridge Ch. of Eng. Assoc., warehouse clerk—Arith. (2d)
919—Bishop, William J., 19, City of London Coll., foreign correspondent—Spanish (2d); Music (3d)
729—Blackburne, William, 20, Handsworth W.M. Club, chaser and embosser—Free-hd. Dwg. (2d)
533—Blair, James, 19, Pop. Evg. Classes, And. Univ., Glasgow, clerk—Music (2d)
1068—Blake, Samuel, 18, Roy. Polyt. Inst., fruiterer—French (3d)
36—Blakemore, George, 20, Farnham Young Men's Assoc., teacher—Free-hd. Dwg. (3d)
592—Blane, James, 18, Glasgow Ath., law clerk—Bkpg. (2d)
807—Blasby, Frederick J., 21, Ipswich W.M. Coll., clerk—Bkpg. (2d)
1474—Blatch, Thomas, 19, Southampton Ath., engineer—Arith. (3d)
1570—Board, George, 23, St. John's (Wolverhampton) Evg. Sch., schoolmaster—Princ. Mech. (3d)
452—Bond, Samuel J., 17, Devonport M.I., engineer student—Alg. (2d)
1166—Booth, Benjamin, 18, Mossley M.I., minder—Bkpg. (3d)
1566—Booth, Henry C., 24, St. Peter's (Wolverhampton) Evg. Sch., teacher—Eng. Hist. (2d); Geom. (3d)
787—Booth, Isaac, 31, Hope Chapel (Denton) Y. Men's Soc., book-keeper—Arith. (1st); Alg. (3d)
517—Booth, John, 18, Freetown W.M. Inst., Glossop, weaver—Free-hd. Dwg. (3d)
605—Borthwick, James D., 22, Glasgow Ath., clerk—Eng. Lit. (2d)
210—Bottomley, Alfred W., 16, Bradford M.I., warehouseman and clerk—Arith. (2d); French (3d)
1451—Bourne, Swaine, 22, Messrs. Chance's Library—Free-hand Dwg. (3d)
488—Boys, John, 22, Droylsden Educ. Inst., weaver—Chem. (3d)
169—Bradley, Thomas, 19, Bollington Useful Knowledge Soc., cotton piecer—Arith. (3rd)
920—Brearley, Benjamin, 21, City of Lond. Coll., clerk—Arith. (3rd); Bkpg. (2d)
1525—Brearley, James S., 31, Stocksbridge Mut. Imp. Soc., wire drawer—Bkpg. (3d)
1404—Brelsford, George E., 20, Salford W.M. Coll., clerk—Bkpg. (2d)
1390—Brelsford, William, 22, Salford W.M. Coll., clerk—Arith. (2d); Bkpg. (1st)
340—Brett, Alfred B., 37, Burrage-road Schools, Plumstead, carpenter—Geom. Dwg. (2d)
1248—Bridge, Alfred, 23, Padiham Church of Eng. Night School, warehouseman—Arith. (3d)
499—Briggs, Isobel L., 18, Edinburgh Local Board, governess—Music (3d)
735—Brierley, James, 19, Haslingden M.I., weaver—Geog. (3d)
792—Brierley, William, 29, Hope Chapel (Denton) Y.M. Soc., book-keeper—Bkpg. (3d); Pol. and Soc. Econ. (3d)
432—Bright, Henry, 32, Deptford Local Board, shipwright—Arith. (3d)
405—Brindle, Thomas, 20, St. George's Ch. Inst., Chorley, furniture broker—Arith. (1st); Bkpg. (3d)
413—Bristow, William, 25, Christchurch W.M. Inst., teacher—Arith. (1st); Eng. Hist. (1st); Geom. (3d)
100—Brittain, Thomas, 21, Belfast Acad., clerk—Arith. (1st)
53—Broadbent, James, 26, Ashton and Dukinfield M.I., iron moulder—Pol. and Soc. Econ. (3d)
1484—Broadbent, John J., 22, Staleybridge M.I., driller—Geom. Dwg. (3d)
921—Brock, George W. F., 19, City of Lond. Coll., clerk—Bkpg. (2d); French (2d)
815—Brooke, Loombe, 19, King's Lynn Ath., assistant teacher—Arith. (1st)
1061—Brooks, Marion, A., 29, Roy. Polyt. Inst., daily governess—French (3d)
1223—Brooks, Peter, 21, Oldham Lyceum, brickmaker—Arith. (1st); Bkpg. (2d); Alg. (3d)

983—Brosnahan, William, 31, London M.I., Inland Revenue Officer—Arith. (1st); Eng. Hist. (1st)
178—Broughton, James, 22, Bolton M.I., engineer—Geom. Dwg. (3d)
352—Broughton, Robert A., 16, Burrage-road Schools, clerk—Geom. Dwg. (3d)
326—Brown, George, 17, Burrage-road Schools, Plumstead, wheelright—Geom. Dwg. (2d)
896—Brown, Henry F., 20, Liverpool Inst., clerk—Arith. (3d)
639—Brown, James, jun., 20, Glasgow Inst., junior clerk—Bkpg. (2d)
1205—Brown, James, 20, Oldham Lyceum, joiner—Geom. Dwg. (3d)
525—Brown, James B., 21, Gilford Mut. Imp. Society, clerk—Bkpg. (1st)
124—Brown, James B., 17, Belfast Acad., in the linen trade—Arith. (2d); Alg. (2d); Geom. (2d); Eng. Hist. (3d)
534—Brown, John, 26, Pop. Evg. Classes, And. Univ., Glasgow, building surveyor's assistant—Anim. Phys. (2d)
409—Brown, Thomas, 41, St. George's Church Assoc., Chorley—Certificated Teacher—Mens. (1st); Light and Heat (2d); Bkpg. (3d); Anim. Phys. (3d)
1650—Brown, Thomas, 19, Worcester Cath. Inst., tailor Arith. (2d)
535—Brown, William, 19, Pop. Evg. Classes, And. Univ., Glasgow, teacher—Anim. Phys. (2d)
536—Brown, William, 23, Pop. Evg. Classes, And. Univ., Glasgow, warehouseman—Music (1st)
1595—Brown, William, 17, Science Schools, Royal Arsenal, Woolwich, engineer—Geom. Dwg. (3d); Mens. (3d)
392—Brown, William E., 16, Chelmsford, Lit. Inst.—Free-hd. Dwg. (3d)
922—Brown, William H., 20, City of Lon. Coll., clerk—French (1st); Spanish (2d)
*127—Browne, William M., 21, Belfast Acad., teacher—Alg (1st); Con. Sect. (1st); Geom. (2d); Trig. (3d)
1544—Brownhill, William, jun., 23, Walsall Ch. Inst., ironmaster's clerk—Bkpg. (3d); Alg. (2d)
1015—Buck, Ellen, 25, London M.I.—French (3d)
1017—Buck, Emily, 21, London M.I.—French (3d)
842—Buck, Thomas W., 20, Leeds M.I., wholesale druggist—Chem. (3d)
1213—Buckley, Eli, 23, Oldham Lyceum, machine fitter—Geom. Dwg. (3d)
313—Bullock, Ebenezer D., 27, Burrage-road Schools, fitter—Geom. Dwg. (3d)
984—Burgoyne, William, 20, London M.I., clerk—Arith. (1st); Eng. Hist. (1st), with 2nd prize; Geog. (1st)
1019—Burke, Charles, 17, London M.I., clerk—Arith. (3d); French (3d)
453—Burner, William H., 19, Devonport M.I., R.N. engineer (student)—Alg. (2d); Princ. Mech. (2d)
1498—Burnett, Thomas, 21, Stockport M.I., clerk—Arith. (1st)
837—Burton, Frederick H., 16, Leeds M.I., chemist—Chem. (3d)
1046—Bury, Peter, 23, Roy. Polyt. Inst., clerk—Arith. (1st); Eng. Hist. (3d); Geog. (3d)
1561—Butler, George W., 18, Messrs. Bagnall's School, West Bromwich, stock-taker—Arith. (2d); Free-hand Dwg. (2d)
823—Butler, John, 26, Leeds Church Inst., railway clerk—Bkpg. (1st), with 1st prize.
454—Butler, Richard J., 18, Devonport M.I., engineer student—Alg. (2d); Princ. Mech. (2d)
1642—Byatt, Horace, 23, St. Thomas' Schools, Woolwich, schoolmaster—Geom. Dwg. (2d)

1389—Cadness, Frederick C., 24, Salford W. M. Col., carrier's clerk—Arith. (3d)
171—Cain, Joseph G., 23, Bolton M.I., engineer—Geom. Dwg. (3d)
95—Cairns, Thomas E., 17, Belfast Acad., clerk—Arith. (3d); Algeb. (3d).
538—Campbell, Archibald, 25, Pop. Evg. Classes, And. Univ., Glasgow, chemist—Light and Heat (3d)
540—Campbell, Isabella G., 33, Pop. Evg. Classes, And. Univ., Glasgow—Music (3d)
539—Campbell, John, 38, Pop. Evg. Classes, And. Univ., Glasgow, calenderer—Music (2d)
658—Campbell, Peter, 17, Glasgow M.I., clerk—Arith. (3d)
455—Canter, George C., 20, Devonport M.I., shipwright apprentice—Alg. (1st); Con. Sect. (2d); Geom. (2d)
348—Candler, George, 25, Burrage-road Schools, Plumstead, carpenter—Geom. Dwg. (2d)
923—Carr, Francis John, 21, City of Lond. Coll., clerk—Bkpg. (3d)
699—Carter, George, 20, Halifax M.I., pawnbroker's assistant—Bkpg. (2d)
1610—Carter, Robert A., 21, Science Schools, Roy. Arsenal, Woolwich, shipwright—Geom. Dwg. (3d)
1151—Carter, William, 18, Manchester M.I., engineer—Geom. Dwg. (1st), with 2d prize
864—Cartwright, William, 20, Leeds Y. Men's Christian Assoc., horse driver (railway)—Bkpg. (3d)
1646—Casson, Thomas, 23, Worcester Rwy. Lit. Inst. draughtsman—Arith. (1st); Geog. (3d)
399—Caton, Walter, 17, Chelmsford Lit. and Mech. Inst., clerk—Bkpg. (3d)
1001—Cecil, Henry, 18, London M.I., clerk—Geog. (2d)
591—Center, William, 22, Glasgow Ath., draper—French (2d)
1700—Chadderton, Joseph, 25, Newton Heath M.I., silk weaver—Geom. Dwg. (2d)
196—Chadwick, Edmund, 17, Bolton Church Inst., engineer—Chem. (3d)
1682—Chambers, John, 19, Blackburn M.I., weaver—Arith. (3d)
1625—Chambers, William, 25, St. Thomas' School, Woolwich, engineer—Geom. Dwg. (3d)
924—Champion, William, 22, City of London Coll., clerk—Bkpg. (1st)
1533—Chance, Henry, 17, Stourbridge Ch. of Eng. Assoc., glass trade—Free-hd. Dwg. (3d)
456—Chapple, Samuel, 16, Devonport M.I., clerk—Arith. (2d)
1092—Chantry, Lucy, 24, Macclesfield Useful Knowledge Soc., housekeeper—Dom. Ecom. (1st)
1490—Charlesworth, James, 25, Stockport M.I., bookkeeper—Arith. (2d); Bkpg. (1st)
1633—Charlesworth, Thomas, 22, St. Thomas' Schools, Woolwich, wheeler—Geom. Dwg. (2d)
1575—Chater, John H., 18, Wolverhampton Ath., clerk—Arith. (3d)
985—Chatterley, Robert J., 20, London M. I., clerk—Arith. (3d); Geog. (2d)
1594—Chilcott, William W., 18, Science School, Roy. Arsenal, Woolwich, engineer student—Geom. Dwg. (2d); Mensur. (2d)
1599—Child, Thomas, 26, Greenwich School of Science, blacksmith—Geom. Dwg. (2d)
614—Clark, James, 20, Glasgow Ath. book-keeper—French (3d)
457—Clark, Robert G., 28, Devonport M. I., shipwright—Bkpg. (2d)
1158—Clark, William S., 19, Manchester M. I., pattern-maker—Geom. Dwg. (3d)
458—Clarke, Frederick H., 17, Devonport M. I., accountant—Arith. (1st); Bkpg. (2d)
925—Clarke, Henry G., 20, City of Lond. Coll., jeweller's assistant,—Eng. Hist. (2d)
1658—Clarke, Walter, 18, York Inst., pupil teacher—Arith. (2d); Eng. Hist. (3d); Geog. (3d)

1556—Clayton, Edwin, 18, Messrs. Bagnall's School, West Bromwich, assistant teacher—Arith. (1st); Eng. Hist. (2d); French (3d)
1514—Clayton, Joseph J., 28, Stockport M. I., stonemason—Geom. Dwg. (3d)
1201—Clegg, John, 24, Oldham Analyt. Lit. Inst., self-actor minder—Geom. Dwg. (3d)
926—Clementson, Alfred B., 26, City of Lond. Coll., clerk—Dom. Econ. (1st)
213—Clough, William H., 21, Bradford M. I., stationer's assistant—Bkpg. (3d)
272—Coaker, Samuel T., 16, Bristol Trade School, engineer—Geom. Dwg. (2d)
1564—Coates, Charles, 20, Whitby M. I., attorney's clerk—Eng. Lit. (2d)
722—Coates, William, 17, Halifax W. M. Coll., woolcomber—Bkpg. (3d)
122—Cochrane, Ernest, 16, Belfast Acad.—Arith. (2d); Geog. (3d)
702—Cockroft, Ellis, 20, Halifax W. M. Coll., Woolsorter, Bkpg. (2d)
1648—Cole, Thomas E., 18, Worcester Cath. Inst., glover—Arith. (3d)
1697—Coley, Henry, 17, Stroud Instit., upholsterer—Elect. and Magn. (3d)
134—Collins, Joseph, 19, Birm. and Midl. Inst., die-sinker.—Eng. Lit. (2d)
1601—Conning, James, 25, Greenwich Lit. Inst., shipwright—Geom. Dwg. (3d)
299—Connor, James, 29, Burrage-road Schools, Plumstead, engine-fitter—Geom. Dwg. (3d)
1263—Connor, John, 39, Paisley Artizan's Inst., carpet weaver—Music (2d)
785—Consterdine, William, 19, Hyde M.I., apprentice to small ware dealer—Light and Heat (3d)
1031—Cook, Harriet, 22, Royal Polyt. Loc. Board—Eng. Lit. (1st)
353—Cook, Samuel, 16, Bury Ath., engineer and machinist—Geom. Dwg. (3d)
14—Cook, William, 20, Aberdeen M.I., compositor—French (2d)
1437—Cooke, George E., 18, Slough M.I., carpenter—Geom. Dwg. (3d)
1291—Cooper, Elizabeth, 17, Preston M.I., photog. assistant—Dom. Econ. (2d)
40—Cooper, Harry, 16, S.E.Ry. Mech. Inst., Ashford, pupil teacher—French (2d)
1448—Cooper, Tom, 17, Spon-lane Inst.—Arith. (1st)
1103—Cornelius, Alexander H., 16, Manchester M.I., jun. clerk—Bkpg. (3d)
701—Couldwell, James W., 18, Halifax W.M. Coll., clerk—Bkpg. (1st)
1549—Cox, Edward J., 18, Bradford-st. (Walsall) Lit. Assoc., saddler's ironmonger—Arith. (3d)
1018—Cox, James E., 22, London M.I., accountant's clerk—Arith. (2d)
928—Cowley, Albert L., 26, City of London Coll., bookbinder—Music (1st)
7—Craig, James A., 16, Aberdeen M.I., clerk—Arith. (2d)
629—Craig, John, 17, Glasgow Inst., clerk—Arith. (1st); Geog. (2d); Eng. Hist. (3d)
884—Craine, Thomas, 17, Liverpool Inst., clerk—Arith. (1st)
929—Cranston, Edwin, 21, City of Lond. Coll., clerk—Arith. (3d); Eng. Hist. (2d)
749—Crawshaw, Joseph, 32, Heywood M.I., joiner—Geom. Dwg. (2d)
587—Crichton, James, 26, Glasgow Ath., commercial traveller—Logic and Mental Sci. (2d)
1309—Crompton, William, 20, Preston Inst., assistant teacher—Free-hd. Dwg. (2d)
769—Crook, Robert, 17, Huddersfield M.I., tobacconist—Arith. (3d)
286—Crossley, Jonas, 20, Burnley M.I., weaver—Arith. (2d); Bkpg. (3d)
743—Cullwick, Benjamin, 29, Hastings M.I., watchmaker—Eng. Hist. (2d)
1256—Cunningham, Thomas A., 18, Paisley Artiz. Inst., clerk—Arith. (2d)
930—Curtis, Edwin R., 22, City of Lond. Coll., clerk—French (1st)
1673—Cuthbert, Robert, 34, Belfast People's Lit. Inst., clerk and warehouseman—Bkpg. (3d)
254—Cutter, John, 16, Bristol Ath., farmer—Arith. (3d)

21—Dale, John, 32, Alderley Educ. Inst., joiner and cabinet maker—Geom. Dwg. (2d); Music (2d); Geog. (3d)
1481—Davis, Arthur H., 20, Southampton Ath., art student—Free-hd. Dwg. (2d)
135—Davis, Elizabeth, 21, Birm. and Midl. Inst., teacher—Arith. (1st)
239—Davis, Gethyn, 20, Bristol Trade School—Chemistry (3d)
44—Davis, James S., 19, S.E.R. M.I., Ashford, railway clerk—Arithmetic (1st)
1387—Davis, Alfred, 19, Salford W.M. Coll., book-keeper—Bkpg. (2d)
830—Davis, George, 19, Leeds M.I., salesman—Geog. (2d)
719—Davis, James W., 23, Halifax W.M. Coll., blue-dyer—Chem. (1st) with 2d prize
1694—Davies, Stephen W., 25, Stroud Inst., letter-carrier—Geom. Dwg. (3d); Animal Phys. (3d)
931—Day, Thomas J., 26, City of Lond. Coll.—Bkpg. (1st)
767—Dearden, Fred. W., 17, Huddersfield M.I., clerk—Arith. (2d); French (3d)
1080—Delahay, Thomas, 26, St. Stephen's, Westminster, Evg. School, time-keeper—Arith. (3d)
1148—Delahunty, John, 16, Manchester M.I., bricklayer—Arith. (2d)
869—Deller, William, 20, Lichfield W.M. Assoc., proctor's clerk—Arith. (2d); Music (2d); Free-hd. Dwg. (3d)
215—Denison, John, 17, Bradford M.I., warehouseman—Bkpg. (3d)
383—Dickinson, George, 23, Chatham M.I., storehouseman—Arith. (1st)
932—Dix, George, 32, City of Lond. Coll., clerk—Spanish (2d)
1537—Dixon, Alexander C., 21, Ackworth Inst., teacher—Arith. (1st); Bkpg. (1st); Alg. (2d); Mensur. (3d)
1641—Dixon, Isaac, 26, St. Thomas' School, Woolwich, engine fitter—Geom. Dwg. (2d)
523—Doak, William, 20, Gilford Mut. Imp. Soc., manufacturer—Arith. (3d)
713—Dobson, Samuel, 20, Halifax W.M. Coll., overlooker—Bkpg. (2d)
372—Dobson, Thomas G., 21, Carlisle W.M. Inst., clerk—Arith (1st); Bkpg. (2d)
1280—Dodd, Thomas J., 19, Portsmouth Local Board, shipwright (apprentice)—Alg. (1st); Conic Sec. (2d); Mensur. (2d)
1134—Dodgson, W., 21, Manchester M.I., mechanic—Arith. (1st); Alg. (3d)
880—Donnelly, Daniel, 16, Liverpool Inst., clerk—Arith. (3d)
1257—Donnelly, William, 33, Paisley Artisans' Inst., carpet weaver—Music (3d)
1436—Dorrell, Arthur J., 17, Slough M.I., carpenter—Geom. Dwg. (3d)
1619—Dorrell, Charles F., 22, St. Thomas's Schools, Woolwich, accountant's clerk—Geom. Dwg. (2d)
1563—Douglas, John G., 19, West Hartlepool M.I., clerk H.M. Customs—Arith. (1st); Latin, &c. (2d); Bkpg. (3d)
1119—Dove, Joseph M., 20, Manchester M.I., labourer—Bkpg. (1st)
650—Dow, John, 16, Glasgow M.I., office lad—Bkpg. (2d)

305—Dow, William, 17, Burrage-road Schools, Plumstead, turner—Geom. Dwg. (2d)
1065—Downar, George F., 22, Royal Polyt. Inst., clerk—Anim. Phys. (1st) with 2nd Prize; Elect. and Mag. (2d)
301—Downar, William A., 32, Burrage-road Schools, Plumstead, draughtsman—Geom. Dwg. (2d)
136—Downes, John, 19, Birm. and Midl. Inst., gas fitter—Arith. (3d)
137—Dowling, John N., 18, Birm. and Midl. Inst., insurance clerk—French (3d)
604—Downie, James, jun., 18, Glasgow Ath., clerk—French (2d)
166—Downing, Sampson, 30, Bodmin Lit. Inst., schoolmaster—Elect. and Mag. (1st); Anim. Phys. (2d)
786—Downs, John, 20, Hope Chapel (Denton) Y. Men's Soc., hatter—Geog. (3d)
1208—Downs, Richard, 16, Oldham Lyceum, mechanic—Geom. Dwg. (3d)
1314—Driver, Benjamin, 19, Crawshaw Booth Lit. and Mech. Inst., clogger—Arith. (1st)
184—Duckworth, Walter, 20, Bolton M.I., clerk—Arith. (2d)
315—Duff, Charles, 38, Burrage-road Sch., Plumstead, lithographic printer—Geom. Dwg. (2d)
505—Duff, William, 31, Watt Sch. of Arts, Edinburgh, commercial clerk—Arith. (2d)
138—Dugard, William H., 20, Birm. and Midl. Inst., metal dealer and roller—Prac. Mech. (2d)
1443—Dugmore, William, 24, Smethwick Local Board, glass painter—Free-hd. Dwg. (2d)
801—Duningham, Albert H., 23, Ipswich W.M. Coll.—Bkpg. (2d)
490—Dunkerley, Eliza, 17, Droylsden Educ. Inst., weaver—Dom. Econ. (2d)
302—Dunn, James J., 28, Burrage-road Schools, Plumstead, fitter and turner—Geom. Dwg. (2d)
707—Dyson, Henry, 17, Halifax W.M. Coll., pupil teacher—Arith. (1st); Bkpg. (2d)
768—Dyson, William H., 25, Huddersfield M.I., waste dealer—Spanish (1st) with 1st prize; French (2d)

1021—Earl, Edward, 22, Lond. M.I., dispenser—Chem. (3d)
202—Edge, Henry, 18, Bolton School of Science, pupil teacher—Arith. (1st); Eng. Hist. (2d); Geog. (2d); Alg. (3d)
139—Edmonds, Sarah, 20, Birm. and Midl. Inst., teacher—French (3d)
1006—Edwards, John, 26, Lond. M.I., draper's assistant—Alg. (3d)
1268—Edwards, Thomas, 18, Pem. Dock M.I., shipwright apprentice—Trig. (1st) with 1st prize; Princ. Mech. (1st); Con. Sec. (2d)
615—Edwards, Thomas, 30, Glasgow Ath., teacher—Logic, &c. (3d)
1219—Edwards, William, 31, Oldham Lyceum, national schoolmaster—French (3d)
88—Elliott, James K., 20, Belfast Acad., holy orders (proposed)—Alg. (2d); Geom. (3d)
1128—Elliott, Thomas G., 18, Manchester M.I., clerk—Bkpg. (3d); Anim. Phys. (3d)
933—Elliott, William S., 32, City of Lond. Coll., clerk, Admir. Reg., Doctor's Commons—Bkpg. (2d)
1630—Ellis, Alfred, 21, St. Thomas' Schools, Woolwich—Geom. Dwg. (2d)
1602—Ellis, George, 19, Greenwich Lit. Inst., fitter—Geom. Dwg. (3d)
934—Ellis, James F., 19, City of London Coll., lithographer—Bkpg. (2d); Alg. (2d); Geog. (1st), with 1st prize; also the Roy. Geog. Society's Prize of £5.
460—Ellis, Richard, 22, Devonport M.I., shipwright—Con. Sec. (1st); Mens. (2d); Geom. Dwg. (3d)
1078—Ellis, Walter J., 18, St. Stephen's, West. Evg. School, pupil teacher—Arith. (1st)
1687—Eltoft, Thomas, 21, Accrington M.I., shop assistant—Chem. (3d)
863—Emsley, Thomas, 24, Leeds Y. M. Chris. Assoc., weaver—Arith. (1st); Geom. (3d)
*1331—Endersby, William, 16, Lambeth Evg. Classes, clerk—Arith. (3d)
248—England, Henry R., 25, Bristol Trade School, clerk—French (3d)
1123—Entwistle, Thomas B., 18, Manchester M.I., bookkeeper—Bkpg. (1st)
935—Evans Francis B., 19, City of Lond. Coll., clerk—German (1st), with 2nd prize.
1388—Evans, Thomas, 19, Salford W.M. Coll., chemists' assistant—Chem. (2d)
395—Eve, George P., 16, Chelmsford Lit. Inst.—Free-hand Dwg. (2d)

49—Fallows, Thomas, 16, Ashton and Dukinfield Inst., piecer—Eng. Hist. (3d)
316—Farlie, John L., 22, Burrage-road Schs., Plumstead, painter, &c.—Geom. Dwg. (3d)
526—Fearon, William, 20, Gilford Mut. Imp. Soc., book-keeper—Arith. (3d); Geog. (3d)
140—Feeny, Victor I., 20, Birm. and Mid. Inst., engineer—Pract. Mech. (2d)
126—Ferguson, James, 24, Belfast Academy, teacher—Arith. (2d)
116 Ferguson, John, 18, Belfast Acad., clerk—Arith. (1st); Alg. (2d); Geom. (2d)
1261—Ferguson, William, 28, Paisley Artizans' Institute, warehouseman—Music (2d)
1116—Fidler, Joseph, 22, Manchester M.I., warehouseman—Arith. (3d); Bkpg. (1st)
71—Fielding, David, 18, Bacup M.I., pupil-teacher—Arith. (3d)
1374—Files, William, 16, St. Helen's M.I.—Arith. (3d)
777—Fillingham, Charles, 18, Hull Young People's Inst., clerk—Bkpg. (2d)
219—Firth, George, 18, Bradford M.I., warehouseman—Arith. (3d)
1049—Fisher, Henry, 22, Royal Polyt. Inst., clerk—Dom. Econ. (1st); Anim. Phys. (2d); Elect. and Magn. (2d)
800—Fisk, Harry W., 17, Ipswich W. M. Coll., attorney's clerk—Bkpg. (1st)
797—Fitzpatrick, William, 19, Ipswich W. M. Coll., railway clerk—Arith. (3d)
1005—Flegg, Robert, 16, London M.I., clerk—Arith. (3d); Geog. (2d)
827—Fleming, Thomas H., 16, Leeds M.I., brushmaker—Arith. (3d); Eng. Hist. (3d); Geog. (3d)
811—Floyd, William, 16, King's Lynn Ath., law clerk—Arith. (1st)
1507—Fogg, Frederick, 19, Stockport M.I., mechanic—Eng. Hist. (3d)
1637—Folkes, Oswald, 19, St. Thomas' Sch., Woolwich, wheeler—Geom. Dwg. (3d)
659—Forbes, Daniel W., 19, Glasgow M.I., engineer—Pract. Mech. (3d)
1631—Ford, Charles C., 17, St. Thomas' Sch., Woolwich—Geom. Dwg. (3d)
431—Ford, Francis, 19, Devonport M.I., engineer student—Arith. (1st); Pract. Mech. (1st), with 1st prize
624—Forrest, Thomas H., 21, Carlton-place (Glasgow) Secular Sch.—Prac. Mech. (3d)
686—Forster, George T., 19, Guisborough M.I., cabinet maker—Arith. (2d)
373—Forsyth, John, 17, Carlisle W. Men's Inst., railway clerk—Arith. (1st); Geog. (2d)
1298—Foster, Richard, 17, Preston M.I., warehouse boy—Arith. (3d)
1276—Foster, William T., 17, Plymouth Wesleyan Inst., carpenter—Eng. Hist. (3d)
365—Fox, John, 18, Bury Ath., fitter—Geom. Dwg. (2d)
234—Francis, Edward, 21, Bristol Trade Sch., certificated teacher—Chem. (3d)

647—Fraser, George, 20, Glasgow M.I., clerk—Bkpg. (2d)
507—Frazer, Alexander, 16, Watt Sch. of Arts, Edinburgh, optician—Arith. (2d)
233—Freestone, R. H., 16, Bristol Trade Sch., chemist's apprentice—Chem. (3d)
1452—Freeth, Henry, 23, Messrs. Chance's Library, glass painter—Free-hd. Dwg. (3d)
47—Fry, Howard, 21, S.E.Ry. M.I., Ashford, engineer—Pract. Mech. (3d); Princ. Mech. (3d)
850—Furbank, Robert A., 22, Leeds M.I., savings-bank clerk—Bkpg. (1st), with 2nd prize
979—Furmage, Francis D., 21, London M.I., solicitor's clerk—Eng. Hist. (3d)
1603—Furniss, Thomas S., 17, Greenwich Lit. Inst., turner and fitter—Geom. Dwg. (3d)
*1330—Fyson, George, 16, Lambeth Evg. Classes, engineer apprentice—Arith. (3d)

1026—Gale, Thomas William, 20, Royal Polyt. Inst., dentist—Chemistry (1st)
231—Gallop, James, 18, Bristol Trade School, clerk—Chemistry (2d)
38—Garaway, Thomas C., 21, S.E.Ry. M.I., Ashford, railway clerk—Arith. (2d)
1615—Gardner, Charles R., 19, Sci. Sch. Royal Arsenal, Woolwich—Geom. Dwg. (1st); Anim. Phys. (3d)
804—Garrett, George A., 22, Ipswich W. M. Coll., messenger—Bkpg. (3d)
1077—Garstang, James John, 16, Royal Polyt. Inst., surveyor's clerk—French (3d)
1620—Garthwaite, Robert G., 19, St. Thomas's School, Woolwich, carpenter and builder—Geom. Dwg. (2d)
724—Gaukroger, James, 17, Halifax W. M. Coll., clerk Arith. (1st)
298—Gaze, Edward H. J., 19, Burrage-road Schools, Plumstead, engineer—Geom. Dwg. (3d)
1487—Gee, Henry, 21, Staleybridge M.I., power-loom weaver—Bkpg (3d)
1156—Gentles, Adam, 20, Manchester M.I., railway carriage builder—Geom. Dwg. (3d)
477—Gibbons, John, 28, Droylsden Educ. Inst., joiner—Geom. Dwg. (3d)
1672—Gibson, Charles, 17, Belfast People's Lit. Inst., clerk—Bkpg. (3d)
1035—Gifford, Augustus C., 16, Royal Polyt. Inst., clerk—Arith. (2d)
1363—Gilbert, Henry E., 22, Rugby Inst., solicitor's clerk—Freehand Dwg. (1st), with 2d prize
141—Giles, Frederick C., 16, Birm. and Midl. Inst., clerk—Arith. (3d)
39—Giles, William T., 20, S.E.Ry. M.I., Ashford, lampmaker—Arith. (3d.)
1259—Gill, James, 24, Paisley Artiz. Inst., shawl pattern designer—Music (1st)
546—Gillespie, John, 19, Pop. Evg. Classes, And. Univ., Glasgow, engineer—Arith. (2d); Pract. Mech. (2d); Mensur. (2d)
870—Gladman, John, 18, Lichfield W.M. Assoc., staff sergeant—Music (2d)
704—Glasby, Charles, 18, Halifax W. M. Coll., warehouseman—Bkpg. (2d)
1581—Golby, Thomas, 19, Wolverhampton Ath., clerk—Arith. (2d); Bkpg. (2d)
848—Goodall, Hamilton, 18, Leeds M.I., mechanic—Alg. (1st); Geom. (3d)
462—Goodyear, Thomas H., 20, Devonport M.I., engineer student—Alg. (1st)
1193—Gorbutt, John, 23, Oldham Temp. Sem., storekeeper—Arith. (3d)
338—Gough, John, 17, Burrage-road Schs., Plumstead, engineer student—Geom. Dwg. (3d)
175—Goulding, Ebenezer, 17, Bolton M.I., clerk—Geom. Dwg. (2d)
607—Graham, David P., 21, Glasgow Ath., book-keeper Bkpg. (2d)
1085—Graham, Joseph, F., 16, St. Stephens' (Westm.), Evg. Sch., clerk—Arith. (1st); Eng. Hist. (2d); Alg. (3d); Geom. (3d)
610—Graham, Robert, 20, Glasgow Ath., wholesale newsagent—French (1st)
1310—Grant, David, 20, Preston Inst., architectural draughtsman—Free-hnd Dwg. (1st)
284—Gray, Alexander, 22, Burnley M.I., weaver—Bkpg. (3d)
547—Gray, James, 23, Pop. Evg. Classes, And. Univ., Glasgow, clerk—Arith. (2d)
937—Gray, Walter, 20, City of Lond. Coll., clerk—Arith. (3d)
142—Green, Edmund, 21, Birm. and Mid. Inst., clerk—French (3d)
271—Green, Henry E., 16, Bristol Trade Sch., clerk—Geom. Dwg. (2d)
143—Green, John R., 25, Birm. and Mid. Inst., toolmaker, Geom. (3d)
1003—Greenfield, William, 20, Lond. M.I., short-hand clerk—Arith. (3d)
1588—Greenhill, Henry H., 17, Science School, Royal Arsenal, Woolwich, engineer apprentice—Geom. Dwg. (3d)
295—Greenway, Charles M., 19, Burnley M.I., chemist—Chem. (3d)
1688—Greenwood, Holmes, 19, Accrington M.I., warehouseman—Arith. (2d); Alg. (3d)
62—Greenwood, James, 16, Baccup M.I., weaver—Arith. (3d); Geog. (3d)
1129—Greenwood, William H., 21, Manchester M.I., engineer—Light and Heat (2d); Pract. Mech. (2d); Princ. Mech. (2d)
1381—Gretton, John J., 19, Salford W.M. Coll., clerk—Arith. (2d); Geog. (3d)
1270—Griffiths, Henry, 25, Pembroke Dock M. I., shipwright—Mensur. (3d)
939—Griffiths, John A., 19, City of London Coll., engineer—Music (2d)
796—Grimwade, John H., 18, Ipswich W. M. Coll. tailor—Bkpg. (1st)
871—Guttridge, Thomas, 25, Lichfield W. M. Assoc. grocer's assistant—Bkpg. (2d)

1489—Hadfield, James, 20, piecer, and teacher of the Evg. Classes—Arith. (1st); Bkpg. (3d)
1705—Hale, Agnes, 19, Dudley M.I.—Free-hd. Dwg. (3d)
1538—Hall, Henry, 17, Wakefield M.I., photographer—Arith. (1st)
654—Hall, James, 19, Glasgow M.I., clerk—Arith. (1st)
515—Hall, Joseph, 22, Freetown Inst., Glossop, cordwainer—Arith. (3d)
1221—Halliwell, Benjamin, 18, Oldham Lyceum, warehouseman—Bkpg. (3d)
606—Hamilton, David R., 16, Glasgow Ath., warehouseman—Bkpg. (2d)
1470—Hamilton, James T., 18, Southampton Ath., clerk—Geog. (1st)
1677—Hamilton, John, 17, Belfast People's Lit. Inst., apprentice—Bkpg. (2d)
1475—Hamilton, William F., 18, Southampton Ath., architect's clerk—Arith. (1st); Geog. (1st); Eng. Hist. (2d)
1495—Hand, John E., 19, Stockport M.I., mechanic—Arith. (2d)
888—Hannah, Francis C., 18, Liverpool Inst., clerk—Arith. (1st); Algeb. (2d)
1663—Hardcastle, Henry, 17, York M.I., clerk—Arith. (1st)
1281—Harding, George, 18, Portsmouth Dockyard School, engineer (student)—Arith. (3d); Pract. Mech. (3d); Geog. (3d)
940—Harding, James S., 27, City of London Coll., clerk—German (1st), with 1st prize.
524—Harding, John C., 36, Gilford Mut. Imp. Soc., teacher—Arith. (3d); Eng. Hist. (3d); Geog. (3d)

1691—Harding, William H., 17, Kidderminster Ch. of Eng. Inst., pupil teacher—Arith. (1st); Eng. Hist. (2d)
1395—Hardman, James, 22, Salford W. M. Coll., book-keeper—Arith. (2d); Bkpg. (2d); Geog. (3d)
1037—Hardy, James, 24, Roy. Polyt. Inst., schoolmaster—Dom. Econ. (1st); Anim. Phys. (1st); Elect. and Magn. (2d)
1690—Hargrave, Charles H., 19, Kidderminster Mut. Imp. Soc., clerk—Arith. (3d)
1312—Hargreaves, Crawshaw, 20, Crawshaw Booth Lit. and M.I., weaver—Arith. (3d)
879—Harley, Thomas, 16, Liverpool Inst., clerk—Arith. (1st); Alg. (1st); Mens. (3d)
1692—Harper, Frederick, 16, Eccleshill M.I., weaver—Arith. (3d)
1029—Harper, John, 26, Roy. Polyt. Inst., book-keeper—Elect. and Magn. (2d); Geog. (2d)
914—Harper, Joseph, 16, Lomeshaye Evg. Sch., weaver Arith. (3d)
1047—Harris, Joseph, 22, Roy. Polyt. Inst., draughtsman—Free-hnd. Dwg. (1st) with 1st prize.
1405—Harrison, Annie, 25, Salford W.M., Coll., schoolmistress—French (2d)
1087—Harrison, Frederick, 42, Louth M.I., carpenter—Arith. (2d)
1043—Harrison, George, 20, Roy. Polyt. Inst., assistant in dispensary—Chem. (2d); Botany (3d)
873—Harrison, Matthew F., 17, Lichfield W.M. Assoc. telegraph messenger—Bkpg. (2d)
819—Harrison, Samuel, 16, Kinver Y.M. Inst., refiner—Arith. (2d)
329—Harrison, William T., 17, Burrage-road School, Plumstead, pupil teacher—Geom. Dwg. (2d)
1226—Harrisson, Joseph E., 19, Oldham Lyceum, draughtsman—Pract. Mech. (2d); Princ. Mech. (3d)
1215—Harrop, George T., 20, Oldham Lyceum, factory operative—Geom. Dwg. (3d)
698—Hartley, Anthony, 20, Halifax M.I., clerk—Bkpg. (2d)
714—Hartley, William, 19, Halifax W.M. Coll., wool sorter——Bkpg. (3d)
1550—Harvey, Douglas, 16, Walsall Ch. Inst., clerk—French (3d)
602—Harvey, Robert, 26, Glasgow Ath., teacher—French (2d)
741—Harwood, William N., 25, Hastings M.I., shopman—Arith. (3d)
144—Haseler, Leopold F., 17, Birm. and Midl. Inst., clerk—Chem. (3d)
185—Haslam, James, 18, Bolton Sch. of Sci., pupil teacher—Arith. (1st); Geog. (2d); Alg. (3d); Eng. Hist. (3d)
187—Haslam, Joseph, 23, Bolton Church Inst., clerk—Chem. (3d)
1545—Hateley, Arthur, 17, Bradford-street (Walsall) Lit. Assoc., brassfounder—Arith. (3d); Geog. (2d)
145—Hathaway, Frederick, 21, Birm. and Midl. Inst., clerk—Arith. (2d)
323—Hawes, Joseph W., 38, Burrage-road Sch., Plumstead, brass finisher—Geom. Dwg. (2d)
1681—Haworth, Thomas, 19, Blackburn M.I., bookseller—Eng. Lit. (2d); Geog. (2d)
1505—Hawthorn, John, 18, Stockport M.I., millwright—Geom. Dwg. (3d)
249—Haynes, Robert B., 28, Bristol Trade Sch.—French, (3d)
941—Hazelton, Philip, 18, City of London Coll., clerk—Bkpg. (1st)
1132—Heaton, Richard, 23, Manchester M.I., book-keeper—Bkpg. (1st)
1051—Heaviside, Oliver, 16, Royal Polytechnic Inst., telegraphist—Elect. and Magn. (2d)
700—Hebblethwaite, Joseph, 18, Halifax W.M. Coll., clerk—Bkpg. (2d)
1111—Heeney, Robert, 29, Manchester M.I., salesman—Anim. Phys. (3d)
1180—Hefford, Joseph G., 21, New Swindon M.I., certificated teacher—Music (1st)
1378—Heighway, George, 19, Salford W.M. Coll., warehouseman—Bkpg. (3d)
709—Hellewell, William H., 19, Halifax W.M. Coll., dyer—Chem. (2d)
1179—Helmsley, William T., 16, New Swindon M.I., fitter—Freehd. Dwg. (1st)
1013—Hemming, Frederic R., 21, London M.I., law writer—Eng. Lit. (2d)
1074—Henderson, Joseph, 16, Royal Polytechnic Inst., engraver—Arith. (3d)
1379—Henderson, Joshua H., 21, Salford W.M. Coll., watchmaker—Bkpg. (2d)
1352—Henry, John M., 25, Richmond Parochial Library, gardener—Floric. (2d); Fruit and Veget. Cult. (2d); Geog. (2d)
25—Henshaw, David, 21, Alderley Edge Educ. Inst., wheelwright — Geom. Dwg. (3d); Free-hd. Dwg. (3d)
1024—Henwood, John C., 18, London M.I., clerk—Arith. (2d)
1593—Hepburn, Richard, 23, Science School, Roy. Arsenal, Woolwich, millwright—Geom. Dwg. (1st)
146—Hewitt, James E., 21, Birm. and Midl. Inst., jeweller—French (3d)
1106—Heys, Charles E., 16, Manchester M.I., clerk—Anim. Phys. (3d)
448—Hibbert, John, 22, St. Peter's Evg. School, Derby, clerk—Arith. (1st); Bkpg. (1st); Geog. (2d)
463—Hicks, John, 25, Devonport M.I., tailor—French (3d)
942—Higgin, Charles C., 20, City of Lond. Coll., clerk—Bkpg. (2d)
165—Higgs, Edwin H., 19, Bodmin Lit. Inst., ironmonger—Elect. and Magn. (3d)
1458—Higgs, James H., 30, Southampton Ath.—Mensuration (3d)
1467—Higgs, John C., 26, Southampton Ath. gardener—Fruit and Veget. Cult. (1st), with 1st Prize, and the Roy. Hortic. Soc. Prize of £5; Floric. (3d)
33—Hill, Frederick, 16, Y. Men's Assoc., Farnham, teacher—Arith. (3d); Eng. Hist. (3d)
943—Hill, George, 24, City of Lond. Coll., Clerk—Eng. Hist. (2d); Arith. (3d); Geom. (3d)
746—Hill, Henry G., 24, Hertford Lit. and Sci. Inst., printer—Mensur. (3d)
1446—Hill, Jane, 31, Messrs. Chance's Library—Music (3d)
1667—Hill, John H., 16, York Inst., clerk—Arith. (1st)
1559—Hill, Samuel T., 23, Messrs. Bagnall's School, West Bromwich, schoolmaster—Music (1st)
1465—Hill, William B., 21, Southampton Ath., architect and surveyor—Free hd. Dwg. (3d)
411—Hilliar, William, 17, Christchurch W. Men's Inst., assistant teacher—Arith. (3d)
1306—Hindle, George, 19, Preston Inst., millwright—Geom. Dwg. (3d)
1393—Hindshaw, Mary G., 18, Salford W.M. Coll.—French (3d)
342—Hiscock, Arthur T., 21, Burrage-road Schools, Plumstead, bricklayer—Geom. Dwg. (3d)
308—Hitchcock, Daniel W., 20, Burrage-road Schools, Plumstead, turner and fitter—Geom. Dwg. (3d)
1070—Hoard, William Charles, 17, Roy. Polyt. Inst., clerk—French (2d)
516—Holdgate, Thomas, 25, Freetown Inst., Glossop, weaver—Arith. (3d)
944—Holman, William, 23, City of Lond. Coll., clerk—French (1st)
1206—Holt, George, 16, Oldham Lyceum, fitter—Geom. Dwg. (2d)
548—Hood, John J., 21, Pop. Evg. Classes, And. Univ., Glasgow, compositor—Music (1st)

858—Horne, William, 18, Leeds Y. Men's Christian Assoc., clerk—Arith. (2d)
1659—Horner, Joseph, 17, York M.I., clerk—Arith. (3d)
147—Horton, Robert, 23, Birmingham and Midl. Inst., clerk—Elect. and Mag. (2d)
1557—Horton, William, 17, Messrs. Bagnall's School, West Bromwich, pupil teacher—Eng. Hist. (3d); Geog. (3d)
809.—Hoskins, Joseph, 21, Ipswich W.M. Coll., engineering clerk—Bkpg. (2d)
1576.—Hough, Joseph, 29, Wolverhampton Ath., assistant in an observatory—French (2d)
1212—Houghton, William J., 20, Oldham Lyceum, joiner—Geom. Dwg. (3d)
1152—Howard, Joseph B., 20, Manchester M.I., mechanic Geom. Dwg. (2d)
549—Howatson, Andrew, 20, Pop. Ev. Classes, And. Univ., Glasgow—Min. and Met. (2d)
1653—Hoyle, Alfred, 20, York Inst., pupil teacher—Music (3d)
986—Hudson, Hannah, 24, London M.I., clerk and book-keeper—Bkpg. (3d)
945—Hudson, William, 31, City of London. Coll., teacher—Eng. Hist. (1st)
148—Hughes, Hesketh, 49, Birm. and Midl. Inst., engineer—French (3d)
1048.—Hulland, Rebecca A., 31, Royal Polyt. Loc. Board, governess—Eng. Lit. (2d)
1203—Hulme, Ralph, 17, Oldham Lyceum, surveyor's clerk—Geom. Dwg. (1st)
846—Hunt, Richard, 17, Leeds M.I., teacher—Arith. (3d); Eng. Hist. (3d)
441—Hunt, William, 21, Derby M.I., iron master's clerk—Arith. (1st); Bkpg. (1st)
550—Hunter, James, 31, Pop. Evg. Classes, And. Univ., Glasgow, book-keeper—Bkpg. (3d)
780—Hurst, Mary, 18, Hyde M.I., domestic—Dom. Econ. (2d)
886—Huther, Alfred, 16, Liverpool Inst., clerk—Arith. (3d)
97—Huston, William, 16, Belfast Acad., teacher—Arith. (2d); Alg. (3d)

696—Illingworth, Thomas, 17, Halifax M.I., mechanic—Arith. (3d)
228—Illingworth, Wheater, 17, Bradford M.I., joiner and builder—Arith. (3d)
1209—Ingham, William, 17, Oldham Lyceum, engineer—Geom. Dwg. (2d)
78—Irwin, William, 22, Bessbrook Mut. Imp. Soc., clerk—Arith. (1st); Eng. Lit. (1st.)
1551—Ivens, Coleman, 22, Walsall Ch. Inst., teacher—Eng. Lit. (2d)

304—Jack, Daniel, 23, Burrage-road Schools, Plumstead, machinist—Geom. Dwg. (2d)
835—Jackson, John P., 18, Leeds M.I., chemist and druggist—Chem. (3d)
668—Jackson, Matthew, 16, Glasgow M.I., clerk—Bkpg. (1st)
776—Jackson, William, 29, Hull Young People's Inst., teacher—Arith. (1st)
1348—Jamieson, Andrew, 21, Richmond Paroch. Library, gardener—Floric. (2d); Fruit and Veg. Culture (2d)
380—Jobling, William, 16, Carlisle M.I.—Arith. (2d); Geog. (2d)
1532—Jefferies, George E., 17, Stourbridge Ch. of Eng. Assoc., carpenter—Arith. (3d)
1370—Jenaway, Mary Ann, 19, Rugby Loc. Board—Music (3d); French (3d); Lat. and Rom. Hist. (3d)
1042—Jenkins. Harriette, 21, Royal Polyt. Inst., teacher—Arith. (3d); French (3d)
23—Jepson, John J., 16, Alderley Edge Educ. Inst., joiner—Geom. Dwg. (1st); Free-hd. Dwg. (3d)
1466—Jessop, George F., 17, Southampton Ath., clerk—Geog. (3d)
947—Jewesbury, Frederick N., 19, City of Lond. Coll., science student—Light and Heat (2d); French (2d)
1334—Johnson, Henry, 28, Lambeth Evg. Classes, foreman of carpenters—Geom. Dwg. (2d)
1127—Johnson, John W., 21, Manchester M.I., clerk—Arith. (1st); Bkpg. (2d); French (3d); Geog. (3d)
1097—Johnson, Thomas, 17, Manchester M.I., clerk—Arith. (3d); Bkpg. (2d)
1038—Johnson, Thomas G., 17, Royal Polyt. Inst., silversmith—Arith. (3d) and the Goldsmith's Company's prize of £3.
85—Johnston, William, 20, Belfast Acad., clerk—Light and Heat (2d); Chem. (2d)
1282—Jolliffe, Henry, 18, Portsmouth Dockyard Sch., engineer (student)—Princ. Mech. (1st); Prac. Mech. (2d)
502—Jolly, William, 22, Watt School of Arts, Edinburgh—Arith. (1st)
1095—Jones, Charles, 21, Malvern W.M. Lit. Inst., assistant in a newspaper office—Music (2d)
149—Jones, David Peter, 27, Birm. and Midland Inst., clerk—Arith. (2d)
1146—Jones, Thos., 22, Manchester M.I., clerk—Arith. (1st)
1136—Jordan, William R., 16, Manchester M.I., junior clerk—Arith. (2d)

1301—Kangley, Edward, 19, Preston M.I., church decorator—Free-hd. Dwg. (2d)
1406—Kay, Andrew, 17, Salford W. M. Coll., clerk—Arith. (1st)
1397—Kay, David, 19, Salford W. M. Coll., warehouseman—Arith. (2d)
1396—Kay, Reuben, 21, Salford W. M. Coll., clerk—Arith. (1st); French (2d)
485—Kay, William, 17, Droylsden Educ. Inst., book-keeper—Geom. Dwg. (1st); Chem. (2d); Geog. (3d)
226—Kaye, Uriah, 20, Bradford M.I., clerk—Bkpg. (3d); Mens. (3d)
361—Kearsley, George, 18, Bury Ath., mechanic—Geom. Dwg. (3d)
1350—Keenan, Richard L., 23, Richmond Parochial Library, gardener—Floric. (2d); Botany (2d), with Roy. Hort. Soc. Prize of £3.
891—Kellam, Joseph W., 18, Liverpool Inst., ironmonger's assistant—Bkpg. (3d)
251—Kennedy, James, 33, Bristol Ath., railway clerk—Italian (3d)
1366—Kerans, Sarah Ann, 16, Rugby Local Board—Latin and Roman Hist. (3d)
1233—Kershaw, Jonathan, 31, Glodwick Mut. Imp. Soc., Oldham, pattern maker—Geom. Dwg. (1st)
1020—Keyte, Frank J., 16, London M.I., engineer—Arith. (2d)
1014—Keyte, William R., 20, London M.I., engineer—French (3d); Mens. (3d)
1399—King, Charles, 19, Salford W. M. Coll., putter-out—Arith. (3)
1347—Kingston, Robert C., 20, Richmond Par. Lit. and Reading Room, gardener—Botany (1st), with 1st prize, and the Roy. Hort. Soc. Prize of £5; Floric. (1st), with 1st prize, and the Roy. Hort. Soc. Prize of £5; Fruit and Veget. Cult. (2d); Bkpg. (2d); and the "Gardener's Chronicle" Prize of £3.
256—Kinnersley, Joseph, 18, Bristol Ath., clerk—Arith. (1st); Bkpg. (2d)
1552—Kirkpatrick, Vincent, 21, Bradford-street (Walsall) Lit. Assoc., in a brass and iron foundry—Eng. Hist. (3d)
435—Kitson, William L., 16, Deptford Local Board, clerk—Arith. (3d)

1604—Knowles, Edward D., 20, Greenwich Lit. Inst., turner and fitter—Geom. Dwg. (3d)
705—Knowles, John W., 19, Halifax W. M. Coll., pianoforte maker—Bkpg. (3d)
1124—Knowles, Stuart, 19, Manchester M.I., bookbinder—Bkpg. (2d)
899—Kneath, Thomas J., 23, Liverpool Inst., clerk—Bkpg. (1st)
948—Kyle, James W., 23, City of London Coll., clerk—Spanish (3d)
763—Kyne, Thomas G., 18, Huddersfield M.I., clerk—Arith. (2d)

150—Lancaster, William J., 20, Birm. and Midl. Inst., optician—Chem. (3d)
261—Lane, William, 17, Bristol Trade Sch., chemist—Chem. (3d)
1120—Langley, Elston, 18, Manchester M.I., clerk—Bkpg. (2d)
1400—Langridge, David, 32, Salford W.M. Coll., dry-salters' assistant—Chem. (1st)
1428—Langton, George, 24, Scarborough M.I., stonemason Arith. (3d)
1073—Law, Charles A., 25, Royal Polytechnic Inst., clerk—French (2d)
1422—Law, Edwin, 21, Salford W.M. Coll., clerk—Light and Heat (3d); Anim. Phys. (2d)
1096—Lawford, Edward, 19, Malvern W.M. Lit. Inst., builders' clerk—Arith. (3d)
1453—Lawrence, John, 19, Messrs. Chance's Sch., glass painter—Freehd. Dwg. (3d)
616—Lawrie, Andrew, 21, Glasgow Ath., clerk—French, (2d)
1649—Leaman, Andrew, 20, Worcester Cath. Inst., clerk—Arith. (1st); Eng. Hist. (2d)
161—Lean, Ernest, 17, Bodmin Lit. Inst., draper—Elect. and Magn. (3d)
1260—Lee, James, 22, Paisley Artizans' Inst., joiner—Music (3d)
853—Lee, William, 17, Leeds M.I., mechanic—Alg. (2d)
486—Lees, Robert W., 18, Droylsden Educ. Inst., pupil teacher—Geom. Dwg. (1st); Chem. (3d); Geog. (2d)
1546—Leighton, Edwin, 19, Walsall Ch. Inst., clerk—French (3d)
1401—Lenthall, George, 18, Salford W.M. Coll., warehouseman—Geog. (3d)
1438—Lewis, Owen W., 17, Slough M.I., carpenter—Geom. Dwg. (2d)
16—Leys, Frank Stanislaus, 18, Aberdeen M.I., merchant's clerk—French (3d)
489—Lindley, Fanny, 16, Droylsden Educ. Inst., winder—Dom. Econ. (3d)
1357—Linnell, William H. 16, Rugby Inst.—Arith. (3d)
551—Litster, William, 19, Pop. Evg. Classes, And. Univ., Glasgow, warehouseman—Music (2d)
1071—Little, David B., 19, Roy. Polyt. Inst., draper—French (3d); Bkpg. (3d)
339—Little, Edwin, 16, Burrage-road Schools, Plumstead—Geom. Dwg. (3d)
1033—Livesey, Ernest William, 17, Roy. Polyt. Inst., clerk—Chem. (3d)
1258—Lockie, Joseph, 23, Paisley Artizans' Inst., weaver—Music (2d)
759—Lofthouse, Benjamin, 25, Huddersfield M.I., painter—Free hd. Dwg. (3d)
356—Lomax, Ernest D., 17, Bury Ath., pupil teacher—Geom. Dwg. (3d)
1086—Long, James, 20, St. Thomas's Charterhouse, Evg. Classes, merchant's clerk—Arith. (2d); Eng. Hist. (2d); Eng. Lit. (3d)
57—Lord, Caleb, 18, Bacup M.I., joiner—Arith. (3d)
360—Lord, George, 24, Bury Ath., mechanic—Geom. Dwg. (2d)
1032—Lord, Henrietta Frances, 18, Roy. Polyt. Inst.—Dom. Econ. (1st); Latin, &c. (3d)
63—Lord, John Priestley, 17, Bacup M.I., warehouseman—Arith. (3d)
1234—Lord, Tunnicliff, Glodwick Mut. Impt. Soc., Oldham, mechanic—Geom. Dwg. (2d)
508—Low, Charles, 18, Watt Sch. of Arts, Edinb., clerk—Arith. (2d)
444—Longman, William T., 19, Derby M.I., assistant master—Free hd. Dwg. (3d)
1568—Ludlam, Isaac S., 19, Wolverhampton Ath., railway clerk—Arith. (1st); Bkpg. (1st)
618—Lyburn, James, 17, Glasgow Ath., book-keeper—French (1st); Bkpg. (3d)

626—Macarthur, John S., 17, Carlton-place Sec. Sch., Glasgow, clerk—Chem. (3d)
703—Macaulay, Peter T., 16, Halifax W. M. Coll., book-keeper—Eng. Lit. (1st); Arith. (2d); Bkpg. (2d)
630—Macbeth, Hugh, 27, Glasgow Inst., bookbinder—Free Hd. Dwg. (3d)
498—MacDonald, John, 28, Watt Sch. of Arts, Edin., engineer—Pol. and Soc. Econ. (3d)
552—Macdonald, Peter, 18, Pop. Evg. Classes, And. Univ., Glasgow, civil engineer—Geom. Dwg. (3d)
594—Macdougall, John S., 18, Glasgow Ath., clerk—French (1st) with 2d prize
617—Macfadyen, Daniel, 18, Glasgow Ath., warehouseman—French (3d)
351—Machen, William J., 27, Burrage-road School, Plumstead, carpenter and joiner—Geom. Dwg. (2d)
268—Machin, Thomas F., 16, Bristol Trade Sch., clerk Geom. Dwg. (2d)
99—Mackie, Henry, 22, Belfast Acad., civil engineer—Alg. (2d); Geom. Dwg. (2d); Geom. (3d)
828—Mackie, Nathan A., 18, Leeds M.I., Customs clerk—Arith. (1st); Eng. Hist. (1st); Geog. (1st); Alg. (2d)
30—Mackintosh, James A., 18, Aldershot Local Board, teacher—Arith. (1st); Alg. (2d)
73—Maden, Isabella, 19, Bacup M.I., weaver—Dom. Econ. (3d)
1685—Magrath, Thomas K., 18, Blackburn M.I., clerk—Arith. (3d); Eng. Hist. (3d); French (3d)
1674—Maitland, Alexander S., 21, Belfast People's Lit. Inst., clerk and manager—Bkpg. (3d)
1421—Makin, John B., 26, Salford W.M. Coll., warehouseman—Arith. (3d)
1359—Malin, Thomas, 16, Rugby Inst., railway clerk—Free-hand Dwg. (3d)
224—Mallinson, Dan, 21, Bradford M.I., grocer's assistant—Arith. (2d)
949—Mallett, William R., 22, City of Lon. Coll., clerk Geom. Dwg. (2d); Free-hand Dwg. (3d)
52—Manwood, Samuel, 16, Ashton and Dukinfield Inst., tin-plate worker (Geom. Dwg. (3d)
1285—Mares, William H., 18, Portsm. Dockyd. Sch., engineer student—Arith. (1st); Alg. (2d); Geom. (2d)
236—Marks, Philip W., 20, Bristol Trade School—Chemistry (2d)
1167—Marland, James W., 20, Mossley M.I., weaver—Bkpg. (2d)
1684—Marples, Theophilus, 12, Blackburn M.I., clothier's assistant—Bkpg. (2d)
1231—Marsden, Thomas, 20, Oldham Lyceum, millwright—Geom. Dwg. (1st)
1016—Marston Emma L., 30, London M.I., teacher—French (2d)
1283—Martin, Frederick, 21, Portsmouth Loc. Board, shipwright—Arith. (1st); Geom. (3d)
778—Martin, John, 19, Hull Young People's Inst., clerk—Bkpg. (3d)
26—Martin, John W., 16, Aldershot Loc. Bd., clerk—Eng. Hist. (3d); Geog. (3d)

981—Martin, William, 18, London M.I., clerk—French (3d)
253—Martin, William R., 17, Bristol Ath., school assistant—Arith. (2d)
950—Masham, William G., 26, City of London Coll., clerk—Geom. (3d)
1461—Massy, Charles, 19, Southampton Ath., clerk—Bkpg. (1st); Free-hd Dwg. (2d)
1456—Massy, William L., 20, Southampton Ath., clerk H.M. Customs—Bkpg. (1st); Princ. Mech. (1st); French (3d)
1638—Mather, Samuel, 24, St. Thomas' School, Woolwich, engine-fitter—Geom. Dwg. (3d)
1165—Maude, Dan, 18, Mossley M.I., warehouseman—Bkpg. (3d)
1088—Mawer, Walter, 29, Louth M.I., printer—Eng. Lit. (3d)
1308—Mayor, Daniel, 32, Preston Inst., shopman—Chem. (3d); Anim. Phys. (2d)
1284—Mayston, John Y., 18, Portsmouth Dockyard School, engineer (student)—Princ. Mech. (1st); Pract. Mech. (2d)
627—McColl, Duncan, 32, Glasgow Inst., cloth-lapper—Bkpg. (3d)
644—McCrindle, Andrew, 18, Glasgow M.I., clerk—Eng. Lit. (3d)
612—McDougald, George, 20, Carlton-place Secular School, Glasgow, normal student—Arith. (1st); Eng. Hist. (3d); Anim. Phys. (3d).
553—McDougall, William H., 16, Pop. Evg. Classes, And. Univ., Glasgow, clerk—Bkpg. (2d)
98—McDowell, James, 17, Belfast Acad., teacher—Arith. (1st)
103—McDowell, John, 18, Belfast Acad., teacher—Arith. (1st)
1012—McFee, James W., 30, Lond. M.I., appraiser—Dom. Econ. (1st)
554—McHardie, James, 21, Pop. Evg. Classes, And. Univ. Glasgow, warehouseman—Music (3d)
773—McIntosh, Donald, 23, Hull Young People's Inst., clerk—Arith. (2d)
772—McIntosh, Douglas, 18, Hull Young People's Chr. and Lit. Inst., clerk—Arith. (3d)
885—McIntyre, John, 17, Liverpool Institute, clerk—(Arith. (1st)
296—McKay, James, 19, Burnley M.I., reporter (proposed)—Polit. and Soc. Econ. (2d); Bkpg. (3d)
1482—McLennan, Donald, 19, Southampton Ath., lithog. draughtsman—Arith. (3d)
1252—M'Millan, 23, Paisley Art. Inst., engineer, (apprentice)—Arith. (3d)
672—McNab, Robert, 23, Glasgow M.I., assistant-teacher—Arith. (1st)
1262—McNaughtan, Alexander, 21, Paisley Artizans' Inst., joiner—Music (2d)
666—McNaughten, James H., 17, Glasgow M.I., clerk—Bkpg. (1st)
618—McNeil, Charles, jun., 19, Glasgow Ath., blacksmith (apprentice)—Arith. (3d)
671—McNeil, John, 21, Glasgow M.I., engineer—Alg. (2d)
557—McOnie, William, 18, Pop. Evg. Classes, And. Univ., Glasgow, clerk—French (3d)
1254—McQueen, John, 25, Paisley Artiz. Inst., engineer—French (3d)
1145—McRobbie, David, 17, Manchester M.I., warehouseman—Geog. (3d)
951—Meadows, William, 19, City of Lond. Coll., clerk—Arith. (1st), with 2nd prize; Dom. Econ. (1st), with 1st prize; Eng. Lit. (1st), with 1st prize; Mensur. (1st), with 1st prize, and the Prince Consort's prize of 25 guineas.
952—Medhurst, John T., 20, City of Lond. Coll., clerk—Arith. (1st); Domestic Econ. (2d); Anim. Phys. (3d)
559—Melliss, Robert M'H., 16, Pop. Evg. Classes, And. University, Glasgow, engineer—Algebra (3d); Geom. (3d)
1094—Melvin, Arthur, 19, Malvern W.M. Inst., clerk—Arith. (2d); Botany (3d)
560—Merrylees, James, 42, Pop. Evg. Classes, And. Univ., Glasgow, manufacturer—Music (1st)
561—Merrylees, Mrs. Rachel, 33, Pop. Evg. Classes, And. Univ., Glasgow—Music (2d)
*686—Metcalf, John A., 22, Guisborough M.I., clerk and book-keeper—Music (3d)
1367—Michells, Anna Maria A., 32, Rugby Local Board, teacher—German (1st); French (1st)
689—Midgeley, Samuel, 22, Halifax M.I., leather salesman—Arith. (3d); Bkpg. (3d)
651—Millar, William J., 27, Glasgow M.I., collector—Princ. Mech. (3d)
1330—Miller, William W., Trinity Sch., Carlisle-street, Lambeth, paid monitor—Arith. (3d); Geog. (3d)
309—Mills, George E., 18, Burrage-road Sch., Plumstead, carpenter—Geom. Dwg. (2d)
497—Miner, Frederic W., 18, Ebley Mut. Imp. Soc., clerk—Arith. (2d)
1241—Minshull, William H., 17, Glodwick Mut. Imp. Soc., Oldham—Geom. Dwg. (3d)
8—Mitchell, George, 26, Aberdeen M.I., jeweller—Free-hand Dwg. (3d)
1479—Mitchell, James T., 16, Southampton Ath., in Ordnance Survey—Arith. (1st)
601—Moir, Charles S., 18, Glasgow Ath., mercantile clerk—Bkpg. (1st)
953—Moles, Joseph, 23, City of Lond. Coll., clerk—Bkpg. (2d)
434—Mondy, Edmund F., 21, Deptford Local Board, shipwright—Arith. (1st); Alg. (1st), with 1st prize; Conic Sec. (1st), with 2d prize
1154—Monks, Peter, jun., 25, Manchester M.I., draughtsman—Geom. Dwg. (1st)
66—Moore, Emanuel, 16, Bacup M.I., warehouseman—Arith. (3d)
1675—Moore, Thomas, 22, Belfast People's Lit. Inst., clerk—Bkpg. (3d)
464—Morcom, Alfred, 18, Devonport M.I., nav. engineer (student)—Eng. Hist. (1st); Princ. Mech. (1st), with 2d prize; Prac. Mech. (2d); Trigon. (2d)
954—Morgan, Hugh, 20, City of Lond. Coll., clerk—Geog. (1st), with 2d prize
252—Morgan, Thomas, 16, Bristol Ath., land surveyor—Arith. (2d)
108—Morrison, Daniel, 16, Belfast Acad., clerk—Arith. (1st)
384—Morrison, John H., 21, Chatham M.I., shipwright—Arith. (1st); Dom. Econ. (1st); Mensur. (1st) with 2d prize.
1668—Morritt, William, 32, York Inst., tailor—music (3d)
1144—Mort, William, 28, Manchester M.I., book-keeper—Anim. Phys. (2d)
1683—Mortimer, Hugh H., 17, Blackburn, M.I., engineer—Arith. (1st); Prac. Mech. (3d)
1101—Mortimer, Thomas, 21, Manchester M.I., accountants's clerk—Bkpg. (1st)
80—Moss, Robert J., 20, Bessbrook Mut. Imp. Soc., apprentice—Arith. (2d)
1159—Moss, Walter W., 19, Manchester M.I., bricklayer—Geom. Dwg. (2d)
1364—Moultrie, Herbert W. F., 18, Rugby Local Board, —Free-hnd. Dwg. (2d)
1369—Moultrie, Mabel P., 18, Rugby Local Board—Free-hnd. Dwg. (2d)
1045—Mountjoy, Richard A., 24, Roy. Polyt. Inst., clerk—Arith. (2d); Eng. Hist. (2d); Geog. (3d)
613—Mowat, William, 17, Glasgow Ath., clerk—French (1st) with 1st prize.
1524—Moxon, Joseph, 34, Stocksbridge Mut. Imp. Soc., wire drawer—Bkpg. (3d)

955—Muir, John B., 19, City of Lond. Coll., clerk—Geog. (2d); Eng. Hist. (3d)
1121—Munn, William W., 19, Manchester M.I., clerk—Arith. (2d); Bkpg. (2d); Geog. (2d); French (3d)
564—Munro, John, 45, Pop. Evg. Classes And. Univ., Glasgow, goods measurer—Music (1st)
1676—Murdoch, James, 17, Belfast People's Lit. Inst., clerk—Bkpg. (3d)
20—Murray, Robert, 17, Aberdeen M.I., bank clerk—French (1st)
281—Murgatroyd, Robert, 16, Burnley M.I., attorney's clerk—Arith. (1st)

1472—Napier, Andrew, 16, Southampton Ath., engineer—Arith. (3d); Geog. (3d); Eng. Hist. (2d)
276—Nelson, John, 19, Burnley M.I., cut looker—Arith. (1st)
1679—Nesbit, William, 21, Belfast People's Lit. Inst., clerk—Bkpg. (3d)
1621—Newman, George, 17, St. Thomas' School, Woolwich, engineer—Geom. Dwg. (2d)
1197—Newton, Isaac, 37, Oldham Anal. Lit. Inst., iron turner—Geom. Dwg. (3d)
*497—Niblett, John W., 18, Ebley Mut. Imp. Soc., fitter and turner—Arith. (2d)
854—Nichols, Joseph W., 20, Leeds Y. Men's Christ. Assoc., clerk—Bkpg. (2d)
1704—Nicholls, Jane, 22, Dudley M.I.—French (3d)
764—Nicholson, George, 21, Huddersfield M.I., warehouseman—Arith. (2d)
11—Nicol, John C., 19, Aberdeen M.I., architect—Geom. Dwg. (1st) with 1st prize; Free-hd. Dwg. (3d)
667—Nimmo, Andrew, 30, Glasgow M.I., engineer—Music (2d)
820—Nisbett, Thomas, 17, Kinver Y. Men's Inst., clerk—Arith. (3d)
408—Nixon, Thomas, 21, St. George's Ch. Inst., Chorley, pattern-maker—Geom. Dwg. (2d)
956—Noakes, Francis M., 19, City of Lond. Coll., pocket-book maker—Geog. (1st); Bkpg. (2d)
997—Norris, William R., 18, London M.I., clerk—Arith. (1st); Eng. Hist. (1st); Geog. (1st)
1168—North, George, 19, Mossley M.I., piecer—Bkpg. (3d)
1515—Norton, Samuel W., 17, Stockport M.I., gas-meter maker—Geom. Dwg. (3d)
479—Nuttall, Thomas, 18, Droylsden Educ. Inst., clerk—Geom. Dwg. (3d)
519—Nutter, William T., 29, Freetown W.M. Inst., Glossop, clerk—Bkpg. (2d)
1041—Nye, Henry S., 16, Royal Polyt. Inst., junior clerk—French (3d)

1110—Oakes, John, 27, Manchester M.I., warehouseman—Bkpg. (2d)
152—O'Connor, Arthur J., 18, Birm. and Midl. Inst., attorney's clerk—Eng. Hist. (3d)
1277—Odam, John, 16, Plymouth Wesleyan Inst., hairdresser—Arith. (3d)
889—O'Donnell, Charles J., 16, Liverpool Inst., apprentice to cotton broker—Bkpg. (3d)
1365—O'Flaherty, Mary Ann L., 17, Rugby Loc. Board—Arith. (3d); Music (3d); French (3d); Geog. (3d)
851—Ogden, Charles B., 17, Leeds M.I.—Algeb. (1st); Geom. (3d)
427—O'Grady, John, 41, Crewe M.I., assistant clerk—Arith. (2d); Bkpg. (3d); Alg. (3d)
90—O'Leary, Michael, 17, Belfast Acad., apprentice to linen trade—Arith. (3d)
813—Ollett, Frederick, 18, King's Lynn Ath., solicitor's clerk—Bkpg. (2d)
980—O'Malley, Thomas, 19, London M.I., clerk—Eng. Hist. (2d); Geog. (2d)
957—Osborne, Francis F., 16, City of London Coll., clerk—Arith. (1st)
266—Osmond, Edgar, 16, Bristol Trade School, clerk—Geom. Dwg. (2d)
1354—Over, Henry W., 16, Rugby Inst., solicitor's clerk—Free-hd. Dwg. (2d)
826—Owen, Edwin B., 18, Leeds Church Inst., clerk—French (2d); German (3d)

861—Page, John W., 23, Leeds Y.M. Christ. Assoc., clerk—Arith. (3d)
1286—Palmer, Henry, 21, Portsmouth Loc. Board, shipwright—Conic Sec. (1st) with 1st prize; Trigon. (2d); Princ. Mech. (2d)
1098—Parkes, Robert, 16, Manchester M.I., apprentice—Bkpg. (2d)
1130—Parnell, George, 23, Manchester M.I., clerk—Arith. (1st); Bkpg. (1st); Alg. (3d); Geom. (3d)
311—Parry, Parton T. W., 28, Burrage-road Schools, Plumstead, saddler—Geom. Dwg. (2d)
509—Paterson, Donald, 23, Watt Sch. of Art, Edinburgh, clerk—Arith. (2d); Mens. (3d)
635—Paton, Robert, 16, Glasgow Inst., clerk—Bkpg. (2d)
1430—Paul, Thomas, 26, Slough M.I., gardener—Floric. (3d); Fruit and Veg. Cult. (3d)
160—Payne, James, jun., 20, Blandford Lit. Inst., attorney's clerk—Geom. (3d)
958—Pearce, Charles E., 23, City of London Coll.—photographer—Free-hd. Dwg. (3d)
831—Pearson, Charles H., 19, Leeds M.I., engineer—Arith. (1st); Algeb. (2d); Bkpg. (3d)
661—Peebles, Robert, 35, Glasgow M.I., railway clerk Arith. (3d)
841—Pegler, Oliver, 19, Leeds M.I., photographic chemist—Chem. (3d)
447—Peick, Amelia, 29, Derby, governess—German (1st); French (1st); Eng. Hist. (2d)
396—Pennack, Thomas, 16, Chelmsford Lit. and Mech. Inst., carpenter—Free-hd. Dwg. (3d)
205—Pennington, Robert T., 22, Bolton Sch. of Sci., warehouseman—Anim. Phys. (3d)
465—Perkins, Charles G., Devonport M.I., solicitor's clerk—Bkpg. (3d)
643—Perks, George G., 17, Glasgow M.I., clerk—Eng. Lit. (3d)
1426—Petch, William, 17, Scarborough M.I., pupil teacher—Arith. (2d); Free-hand Dwg. (3d)
421—Peters, Samuel, 19, Crewe M.I., fitter—Prac. Mech. (3d)
633—Peters, William, 19, Glasgow Inst., apprentice draughtsman—Free-hand Dwg. (2d)
982—Peyton, William G., 19, London M.I., clerk (civil service)—Eng. Hist. (3d)
111—Phenix, Wills, 17, Belfast Acad., clerk—Arith. (3d)
328—Philips, Thomas W., 20, Burrage-road Sch., Plumstead, engineer (apprentice)—Geom. Dwg. (2d)
1273—Phillips, Thomas, 19, Pembroke Dock M.I., shipwright apprentice—Alg. (1st); Mens. (2d)
960—Phillips, William R., 18, City of London Coll., clerk—Arith. (1st); Bkpg. (2d)
687—Pickard, Sam, 20, Halifax M.I., railway clerk—Bkpg. (3d)
1062—Pickering, Edward, 16, Roy. Polyt. Inst., invoice clerk—French (3d)
221—Pickering, Richard C., Bradford M.I., clerk—German (3d)
190—Pickering, Thomas, Bolton Church Inst., bank clerk—Chem. (3d)
961—Pickett, George, 24, City of London Coll., bank clerk—Bkpg. (1st)
64—Pickup, Richard, 18, Bacup M.I., weaver—Geog. (3d)
1224—Pickup, Zenas, 24, Oldham Lyceum, village schoolmaster—Bkpg. (2d)
1053—Pigeard, Maurice, 16, Roy. Polyt. Inst., civil engineer—Elect. and Magn. (3d)

70—Pilling, John Robert, 18, Bacup M.I., book-keeper Arith. (3d); Geog. (3d)
1455—Pitcher, William A., 18, Messrs. Chances' Library, glass painter—Freehd. Dwg. (3d)
1419—Plant, Clement W. F., 18, Salford W.M. Coll., salesman—Arith. (2d); Bkpg. (2d)
1200—Platt, Samuel, 25, Oldham Analyt. Lit. Inst., tin plate worker—Geom. Dwg. (3d)
962—Pollard, Henry T., 19, City of London Coll., clerk—Eng. Hist. (1st)
1417—Poole, James H., 18, Salford W.M. Coll., clerk—Geog. (2d)
745—Poole, Thomas, 22, Hastings M.I., joiner—Arith. (2d); Bkpg. (3d)
10—Pope, Samuel, jun., 29, Aberdeen M.I., writer—Freehd. Dwg. (2d)
153—Porter, Ellen, 21, Birm. and Midl. Inst.—French, (3d)
1022—Porter, John T., 20, London M.I., chemist and druggist—Chem. (2d)
393—Potter, Henry, 17, Chelmsford Lit. and M.I., coach painter—Freehd. Dwg. (2d); with the Coach and Coach Harness Makers' prize of £3.
1645—Powell, Edmund, 17, Birdport (Worcester), Free Church Inst., mercantile clerk—Arith. (1st); Bkpg. (3d)
1109—Powell, Edwin, 18, Manchester M.I., clerk—Bkpg. (1st); Alg. (3d)
1420—Powell, William E., 20, Salford M.I., clerk—Arith. (1st); Bkpg. (2d)
875—Power, John, 22, Lichfield W.M. Assoc., assistant grocer—Arith. (1st); Bkpg. (3d)
987—Pownall, Robert E., 18, London M.I., surveyors' clerk—Arith. (1st); Bkpg. (3d)
1534—Preston, James, 18, Tottington Mut. Imp. Soc., dyer—Arith. (3d)
282—Preston, John, 23, Burnley M.I., weaver—Arith. (2d)
371—Preston, Richard, 17, Bury Ath., pupil teacher—Arith. (3d)
726—Price, Henry, 40, Handsworth W.M. Club, collector of poor rates—Music (3d)
1647—Price, Thomas, 17, Birdport (Worcestershire) Mut. Imp. Assoc., clerk—Arith. (1st); Bkpg. (2d)
1294—Pride, Walter H., 16, Preston M.I., solicitors' clerk—Geog. (2d)
87—Pyper, William, 21, Belfast Academy, teacher—Geom. (3d)
1082—Pywell, John E., 18, St. Stephen's (Westminster) Evg. Sch., pupil teacher—Arith. (2d); Geog. (3d)

1044—Quartermaine, Harry, 17, Royal Polyt. Inst.—Arith. (3d); Geog. (2d)
1607—Quick, James, 19, Science Sch., Roy. Arsenal, Woolwich, shipwright apprentice—Arith. (3d); Anim. Phys. (3d)

1506—Ralphs, Samuel, 23, Stockport M.I., clerk—Bkpg. (1st); Geom. Dwg. (3d)
1699—Randell, James H., 18, Stroud Inst., grocer's apprentice—Arith. (2d); Alg. (3d)
963—Ravenscroft, Burton C., 22, City of Lond. Coll., builder and contractor—Arith. (1st)
240—Raworth, Harrison W., 19, Bristol Trade School, chemist's apprentice—Chem. (3d)
401—Rayner, John C., 19, Chelmsford Lit. and Mech. Inst., clerk—Bkpg. (3d)
906—Reed, John, 17, Lomeshaye Evg. Sch., weaver—Light and Heat (3d)
912—Reed, William, 18, Lomeshaye Evg. Sch., weaver—Light and Heat (3d)
1107—Renshaw, Israel J. E., 20, Manchester M.I., salesman—Music (3d); Anim. Phys. (3d)
566—Reoch, Robert, 26, Pop. Evg. Classes, And. Univ., Glasgow, clerk—Bkpg. (3d)
1143—Reynolds, Richard H., 20, Manchester M.I., stationer—Bkpg. (2d)
1573—Richards, Frances, 17, St. Peter's (Wolverhampton) Evg. Sch., pupil teacher—Arith. (2d); Eng. Hist. (3d); Geog. (3d)
1574—Ridgway, George, 16, St. Peter's (Wolverhampton) Evg. Sch., pupil teacher—Arith. (1st); Eng. Hist. (1st); Eng. Lit. (2d); Geog. (3d)
964—Rigg, Thomas, 21, City of Lond. Coll., clerk—Arith. (1st); Bkpg. (2d); French, (2d)
487—Riley, John, 18, Droylsden Educ. Inst., warehouseman—Arith. (3d); Chem. (3d)
1137—Riley, John, 33, Manchester M.I., warehouseman Arith. (2d); Alg. (3d)
484—Riley, Thomas, 20, Droylsden Educ. Inst., warehouseman—Geom. Dwg. (2d)
214—Riley, William, 16, Bradford M.I., boot-top manufacturer—Arith. (3d)
1040—Riorden, George J., 16, Royal Polyt. Inst., engraver—French (3d)
673—Roberton, Stephen, 21, Glasgow M.I., clerk—Eng. Lit. (3d)
784—Roberts, Alfred, 32, Hope Chapel Y.M. Soc., Denton, roller-coverer—Pol. and Soc. Econ. (3d)
849—Roberts, Charles, 19, Leeds M.I., clerk—Arith. (2d); Geog. (3d)
994—Roberts, John, 24, London M.I., saddler—Eng. Hist. (2d); Geog. (2d)
1416—Roberts, Richard, 39, Salford W.M. Coll., collector—Arith. (3d)
274—Roberts, William P., 27, Bromley Lit. Inst., gardener—Floric. (1st) with 2d prize, and the Royal Horticultural Society's prize of £3
1371—Robertson, Janet P., 20, Rugby Local Board—Latin and Roman Hist. (3d)
96—Robinson, James, 21, Belfast Acad., law writing clerk—Arith. (1st); Alg. (2d); Geom. (3d)
429—Robinson, John, 19, Crewe M.I., engine-fitter—Arith. (1st)
1163—Robinson, John, 17, Mossley M.I., minder—Bkpg. (3d)
1377—Robinson, Robert H., 22, Salford W.M. Coll., clerk—Arith. (3d); Bkpg. (1st)
857—Robinson, Walter J., 29, Leeds Y.M Chris. Asso., mechanic—Geom. Dwg. (1st)
154—Rock, Rose S., 19, Birm. & Midl. I.—German (1st)
568—Roddie, William S., 21, Pop. Evg. Classes, And. Univ., Glasgow, engraver—Music (3d)
177—Rogerson, Edward, 20, Bolton M.I., engineer—Geom. Dwg. (3d)
176—Rogerson, George, 16, Bolton M.I., engineer—Geom. Dwg. (3d)
155—Rollason, Joseph, 28, Birm. and Midl. Inst., accountant—Arith. (1st)
898—Roose, Joseph B., 16, Liverpool Inst., clerk—Geog. (2d)
5—Rose, John, jun., 21, Aberdeen M.I., assistant teacher—Geog. (2d)
641—Ross, David, 24, Glasgow Inst., schoolmaster, —Latin, &c. (1st)
821—Ross, James, 22, Leeds Church Inst., stock-keeper, —Bkpg. (3d)
19—Ross, John, 17, Aberdeen M.I., clerk—French (3d)
569—Ross, Robert, 26, Pop. Evg. Classes, And. Univ., Glasgow—Music (3d)
588—Ross, William J., 19, Glasgow Ath., warehouseman—French (2d)
738—Rostron, Edward C., 19, Haslingden M.I., warehouseman—Dom. Econ. (1st); Geog. (3d)
1218—Rothwell, Edmund, 20, Oldham Lyceum, clerk in gas works—Mens. (3d)
125—Rowan, James, 16, Belfast Acad., goldsmith and jeweller—Arith. (1st) with the Goldsmith's Company's prize of £5.
466—Rowe, Charles R., 20, Devonport M.I., clerk—Arith. (2d)
1118—Rowland, Thomas, 24, Manchester M.I., clerk—Bkpg. (2d)

1230—Roydes, James, 21, Oldham Lyceum, book-keeper —Geom. Dwg. (3d); Bkpg. (3d); Mens. (3d)
1494—Royle, Edward, 18, Stockport M.I., warehouseman —Arith. (1st)
1069—Rush, Henry, 24, Roy. Polyt. I., clerk—French (3d)
806—Rushbrooke, Joseph Y., 20, Ipswich W.M.C., clothier—French (3d)

1333—Sadler, Alfred, 26, Lambeth Evg. Classes, engine fitter—Geom. Dwg. (2d)
570—Sadler, James, 21, Pop. Evg. Classes, And. Univ., Glasgow, shopman—Anim. Phys. (3d)
227—Salter, John W., 16, Bradford M.I., pattern setter —Arith. (1st)
1064—Salter, William, 22, Royal Polyt. Inst., engraver —Arith. (1st); Alg. (2d)
990—Sandiford, James G., 17, London M.I., law clerk —Eng. Hist. (3d)
1287—Sargeant, Frederick, 18, Portsmouth Dockyard Sch., engineer student—Arith. (2d); Alg. (2d); Geom. (3d)
1236—Saxby, John, 22, Glodwick Mut. Imp. Soc., Oldham, mechanic—Geom. Dwg. (2d)
238—Scammell, Edward S., 21, Bristol Trade Sch.— Chem. (2d)
1315—Schofield, James Henry, 17, Crawshaw Booth Lit. and Mech. Inst., errand boy—Arith. (3d)
1217—Scholes, Elijah, 21, Oldham Lyceum, clerk— Arith. (3d); Geog. (3d)
1150—Scholes, Thomas, 23, Manchester M.I., time-keeper—Geom. Dwg. (2d); Bkpg. (2d)
663—Scott, Robert, 19, Glasgow M.I., measurer's assistant—Arith. (1st); Alg. (3d)
572—Scouller, John, 21, Pop. Evg. Classes, And. Univ., Glasgow, clerk—Music (3d)
762—Senior, Richard H., 18, Huddersfield M.I., book-keeper—Arith. (2d)
586—Shanks, Robert, 19, Glasgow Ath., clerk—Bkpg. (3d)
621—Shaw, James, 20, Carlton-place (Glasgow) Secular Sch., normal student—Arith. (2d)
760—Shaw, John E., 18, Huddersfield M.I., warehouseman—Free-hand Dwg. (3d)
691—Shaw, Reuben C., 17, Halifax M.I., overlooker— Arith. (3d)
808—Sheppard, Alfred, 17, Ipswich W.M.C., commercial clerk—Arith. (2d)
1027—Sherlock, Alfred, 21, Royal Polyt. Inst., clerk— Arith. (3d)
1358—Sherratt, Henry, 22, Leamington School of Art, coach-builder's clerk—Free-hand Dwg. (2d)
716—Shiel, Thomas J., 17, Halifax W.M.C., dyer— Eng. Lit. (2d)
573—Shirra, Robert, 26, Pop. Evg. Classes, And. Univ., Glasgow, draper—Anim. Phys. (3d)
1414—Shorrocks, James H., 19, Salford W.M. Coll., clerk—French (2d)
1115—Siddall, James, 16, Manchester M.I., joiner— Bkpg. (2d)
514—Sidebottom, Joshua, 23, Freetown W. Men's Inst., Glossop, clerk—Bkpg. (3d)
218—Silverwood, Leonard, 18, Bradford M.I., book-keeper—Arith. (2d)
966—Simmons, John D., 32, City of London Coll., oil-man—Music (2d)
156—Simpkin, Samuel J., 17, Birm. and Midl. Inst., teacher—Geog. (2d)
798—Simpson, James B., 18, Ipswich W.M. Coll., plumber's apprentice—Bkpg. (3d)
1338—Simpson, James W., 25, Lambeth Evg. Classes— Geom. Dwg. (3d)
1473—Sims, Edward T., jun., 19, Southampton Ath., clerk—Arith. (1st); Eng. Hist. (1st), with 1st prize; Pol. and Soc. Econ. (1st), with 1st prize; Geog. (1st)
897—Skeaf, Frederick F., 17, Liverpool Inst., civil engineer—Arith. (3d); Eng. Hist. (3d)
1558—Skett, William H., 20, Messrs. Bagnall's Sch., West Bromwich, messenger—Free-hand Dwg. (2d)
1324—Skilling, Richard, 21, Rawtenstall M.I., weaver— Arith. (3d)
1296—Sloan, John, 18, Preston M.I., draper—Arith. (3d)
398—Smee, Alfred, 24, Chelmsford Lit. and Mech. Inst., clerk in a provident office—Bkpg. (3d)
1703—Smith, Benjamin, 26, Dudley M.I., colliery clerk— French (2d); Mensur. (3d)
774—Smith, Charles, 21, Hull Young People's Inst., clerk—Bkpg. (3d)
442—Smith, Charles H., 19, Derby M.I., ironmaster's clerk—Alg. (2d); Mensur. (2d)
829—Smith, Frederick, 17, Leeds M.I., clerk of works —Arith. (2d)
574—Smith, George, 20, Pop. Evg. Classes, And. Univ., Glasgow, teacher—Music (3d)
1000—Smith, George L., 19, London M.I., clerk—Arith. (1st); Dom. Econ. (1st)
795—Smith, Harry, 16, Working Men's Coll., Ipswich, brewer's clerk—Arith. (2d); Bkpg. (3d)
1629—Smith, Henry H., 20, St. Thomas's School, Woolwich, turner—Geom. Dwg. (2d)
208—Smith, James, 21, Bradford M.I., clerk—Geog. (2d)
197—Smith, John, 34, Bolton Church Inst., colliery clerk—Anim. Phys. (3d)
403—Smith, John, 35, St. George's Church Inst., Chorley, cashier—French (3d)
575—Smith, John J. H., 23, Pop. Evg. Classes, And. Univ., Glasgow, house painter—Bkpg. (3d)
1454—Smith, Joseph, 18, Messrs. Chance's Library, glass painter—Free-hand Dwg. (1st)
1010—Smith, Martha, 21. London M.I.—Eng. Hist. (1st), with prize of £2.
750—Smith, Roger, 17, Heywood M.I., pattern maker— Geom. Dwg. (3d)
711—Smith, Samuel, 20, Halifax W. M. Coll., warehouseman—Arith. (3d); Bkpg. (3d)
993—Smith, Sarah, 18, London M.I.—Eng. Lit. (2d)
825—Smith, William, 21, Leeds Church Inst., bank clerk—Arith. (2d); Bkpg. (1st)
969—Smith, William A., 16, City of London Coll., clerk—Arith. (1st)
810—Smyth, Edward B., 25, Ipswich W.M. Coll., commercial clerk—Bkpg. (2d)
89—Smyth, James, 19, Belfast Acad., accountant— Arith. (1st); Alg. (2nd); Eng. Hist. (3d)
102—Smyth, Wm., 21, Belfast Acad., clerk—Arith. (3d)
576—Sneddon, James, 33, Pop. Evg. Classes, And. Univ., Glasgow, timekeeper—Music (1st)
437—Spacey, Alfred, 26, Deptford Loc. Board, shipwright—Arith. (1st)
1590—Spalding, Andrew, 19, Science Sch., Roy. Arsenal, Woolwich, engineer apprentice—Alg. (1st)
1457—Sparks, John, jun., 18, Southampton Ath., clerk— Bkpg. (2d)
721—Speak, William, 18, Halifax W.M. Coll., clerk— Arith. (2d)
1375—Spencer, Hugh T., 16, St. Helen's M.I., assistant book-keeper—Arith. (3d)
649—Spreull, David W., 18, Glasgow M.I., civil engineer, &c.—Arith. (1st)
1028—Spriggs, Henry, 17, Roy. Polyt. Inst., draper— Arith. (3d)
1139—Stalker, Robert, 20, Manchester M.I., mechanic— Arith. (3d)
1567—Stanier, Thomas W., 19, Wolverhampton Ath., engineer—Arith. (1st); Music (2d); Practical Mech. (2d)
1578—Stanier, William H., 17, Wolverhampton Ath., railway clerk—Pract. Mech. (1st), with 2nd prize; Mensur. (2d); Trigon. (3d)
65—Stansfield, George S., 17, Bacup M.I., druggist's assistant—Chemistry (3d)
349—Stanton, George, 24, Burrage-road Schools, Plumstead, turner—Geom. Dwg. (3d)

1439—Stanton, George, 26, Slough M.I., gardener—Fruit and Veget. Cult. (1st), with 2nd prize, and the Roy. Hort. Soc. prize of £3
1155—Steele, Thomas, 18, Manchester M.I., mechanic—Geom. Dwg. (3d)
1112—Stephens, William, 19, Manchester M.I., warehouseman—Bkpg. (2d)
642—Stevenson, John, jun., 18, Glasgow M.I., engineer (apprentice)—Arith. (3d)
595—Stewart, John, 19, Glasgow Ath., engineer (apprentice)—Geom. (3d)
55—Stewart, Robert, 21, Bacup M.I., assistant master—Arith. (1st); Geog. (2nd); Alg. (3d)
998—Stewart, William, 23, Lond. M.I., barrister's clerk—Arith. (1st); Eng. Hist. (2d); Geog. (3d)
652—Stobbs, William, 20, Glasgow M.I., clerk—Arith. (1st)
366—Stockdale, William, 16, Bury Ath., cotton spinner—Geom. Dwg. (3d)
1067—Stoddard, John H., 18, Roy. Polyt. I.—Geom. (3d)
1349—Stormont, Alexander, 24, Richmond Paroc. Lib., gardener—Arith. (3d); Fruit and Veget. Cul. (2d)
577—Storrie, John, 23, Pop. Evg. Classes, And. Univ., Glasgow, stereotyper—Botany (2d)
1701—Stott, Henry, jun., 20, Newton Heath M.I., weaver—Geom. Dwg. (3d)
1702—Stott, Henry, sen., 27, Newton Heath M.I., weaver—Geo. Dwg. (3d)
1—Strachan, James, 21, Aberdeen M.I., druggist—Arith. (3d)
12—Strachan, John, 18, Aberdeen M.I., civil engineer—Arith. (1st)
1004—Street, Alice L., 19, London M.I.—Eng. Hist. (3d)
970—Strickland, Peter, 17, City of London Coll., clerk—Arith. (1st)
1009—Styles, Alice C., 23, London M.I.—Dom. Econ. (1st)
1204—Sugden, Thomas, 17, Oldham Lyceum, mechanic—Geom. Dwg. (3d)
814—Suggett, Dix, 23, King's Lynn Ath., clerk—Bkpg, (2d)
56—Sutcliffe, George W., 18, Bacup M.I., weaver—Arith. (1st)
856—Sutcliffe, John W., 19, Leeds Y. M. Chris. Assoc., clerk—Bkpg. (1st)
77—Sutcliffe, Mary, 16, Bacup M.I., sewing machinist—Dom. Econ. (1st)
1084—Sutherland, John, 39, St. Stephen's (Westminster) Evg. School, police sergeant—Arith. (2d); Geog. (2d)
503—Sutherland, John, 17, Watt School of Arts, Edinburgh, draper—Arith. (3d)
167—Sutton, Samuel, 18, Bollington Useful Know. Soc., warehouseman—Arith. (1st)
345—Swinger, William, 27, Burrage-road Schools, Plumstead, draughtsman—Geom. Dwg. (1st)
347—Swanson, William, 18, Burrage-road Schools—Plumstead, turner—Geom. Dwg. (2d)
1023—Symons, James S., 30, London M.I., clerk—French (3d); Botany (3d)

164—Tabb, Lewis H., 18, Bodmin Lit. Inst., draper—Elect. and Mag. (3d)
245—Tabrett, Henry C., 17, Bristol Trade School, fitter—Geom. Dwg. (1st)
246—Tabrett, John W., 16, Bristol Trade School, carriage body maker—Geom. Dwg. (3d)
229—Tanner, Henry W. L., 16, Bristol Trade School—Chem. (2d)
1083—Tapp, George W., 18, St. Stephen's (Westminster) Evg. School—Bkpg. (2d)
473—Tapp, Miles, 19, Devonport M.I., apprentice joiner—Arith. (3d)
81—Tart, John B., 27, Bilston Inst., grocer's assistant—Arith. (3d); Bkpg. (3d)
74—Tattersall, Ann, 19, Bacup M.I., winder—Dom. Econ. (3d)
258—Tavener, Joseph, 19, Bristol Trade School, warehouseman—Chemistry (1st)
518—Taylor, David, 24, Freetown W. Men's Inst., Glossop, clerk—Bkpg. (1st)
1164—Taylor, Enoch, 21, Mossley M.I., cotton-piecer—Bkpg. (3d)
1114—Taylor, James, 18, Manchester M.I., clerk—Eng. Lit. (1st)
1227—Taylor, James, 18, Oldham Lyceum, mechanic—Arith. (2d); Pract. Mech. (2d); Princ. Mech. (3d)
467—Taylor, John A., 18, Devonport M.I., grocer—Anim. Phys. (2d)
1492—Taylor, Samuel, 16, Stockport M.I., book-keeper—Arith. (2d)
1125—Taylor, William, 19, Manchester M.I., clerk—Bkpg. (2d)
1170—Taylor, William, 19, Mossley M.I., warehouseman—Bkpg. (3d)
1149—Teggin, Edward, 16, Manchester M.I., fitter—Arith. (1st)
660—Thislie, Robert, 19, Glasgow M.I., clerk—Bkpg. (2d)
662—Thom, Andrew H., 17, Glasgow M.I., pupil teacher—Arith. (1st); Alg. (2d)
1066—Thomas, Charles J., 16, Roy. Polyt. Inst., clerk—Bkpg. (3d)
1303—Thomas, John, 16, Preston M.I., factory operative—Freehd. Dwg. (2d)
1413—Thomas, William, 18, Salford W.M. Coll., clerk—Arith. (3d)
1075—Thomas, William H., 25, Roy. Polyt. Inst., clerk—French (2d)
379—Thomlinson, John H., 16, Carlisle M.I.—Arith. (1st); Geom. (3d)
425—Thomlinson, Thomas D., 20, Crewe M.I., engine-fitter—Arith. (3d); Pract. Mech. (3d); Mens. (3d)
1411—Thompson, John, 20, Salford W.M. Coll.—Arith. (2d); Bkpg. (1st)
1185—Thomson, Catherine B., 17, New Swindon M.I. milliner and dressmaker—Dom. Econ. (1st)
1351—Thomson, Frederick, 22, Richmond Parochial Lib.—Floric. (2d); Fruit and Veget. Cult. (2d)
648—Thomson, Joseph, 19, Glasgow M.I., shipwright (apprentice)—Arith. (2d)
578—Thomson, William, 17, Pop. Evg. Classes, And. Univ., Glasgow, clerk—Chem. (2d); Anim. Phys. (3d)
430—Thornley, Joseph, 17, Dean Mills Inst., piecer—Arith. (3d)
1172—Thornley, Richard, 17, New Mills Inst., book-keeper—Arith. (3d)
357—Thornton, Thomas, 21, Bury Ath., joiner—Geom. Dwg. (2d)
1488—Thorpe, William T., 22, Staleybridge M.I., warehouseman—Arith. (3d); Bkpg. (3d)
855—Tiffany, John B., 23, Leeds Y.M. Chris. Assoc., tobacco manufacturer—Arith. (1st); Mens. (2d); Eng. Hist. (3d)
1100—Tinker, Thomas J., 16, Manchester M.I., clerk—Arith. (1st); Bkpg. (1st)
852—Todd, William, 20, Leeds M.I., woollen manufacturer—French (3d)
32—Tomlinson, George, 17, Aldershot Local Board, clerk—Arith. (2d); Geog. (2d)
971—Tompkins, Amos, 22, City of London Coll., clerk—German (2d)
310—Topple, Alfred W., 18, Burrage-road Schools, iron turner—Geom. Dwg. (2d)
656—Torrance, John, 23, Glasgow M.I., grocer's assistant—Eng. Lit. (3d)
589—Torrance, John H., 18, Glasgow Ath., clerk—French (3d)

972—Trekell, C. Munro, 17, City of Lond. Coll., clerk—Arith. (3d)
468—Treleaven, Joseph T., 22, Devonport M.I., shipwright—Geom. Dwg. (1st); Mensur. (2d)
803—Trent, Henry C., 19, Ipswich W.M.C., currier—Arith. (2d)
513—Tritton, John D., 18, Faversham Inst., blockmaker (apprentice)—Arith. (2d); Eng. Hist. (2d); Geog. (2d)
1444—Trobridge, George, 16, Messrs. Chance's Schools, junior clerk—Arith. (2d); Free-hd. Dwg. (2d); Geog. (3d)
590—Turnbull, Alexander J., 21, Glasgow Ath., civil engineer—French (3d)
1182—Turnbull, George, 17, New Swindon M.I., apprentice—Arith. (3d)
1331—Turner, Albert, 26, Lambeth Evg. Classes, clerk—Arith. (2d); Eng. Hist. (3d); Geog. (3d)
1485—Turner, Joseph, 32, Staleybridge M.I., joiner—Geom. Dwg. (1st)
781—Turner, Margaret, 28, Hyde M.I., weaver—Dom. Econ. (3d)
1450—Turner, Samuel, 16, Messrs. Chance's Evg. School scorer—Arith. (3d)
1305—Tyson, James, jun., 17, Preston M.I., plasterer—Free-hand Dwg. (2d)

1355—Underwood, William, 16, Rugby Inst., railway clerk—Arith. (2d)

973—Vaughan, William, 26, City of Lond. Coll., clerk—Light and Heat (1st) with 1st prize; Prac. Mech. (2d)
512—Veitch, John, 17, Faversham Inst., teacher—Arith. (3d)
730—Venour, Alfred, 20, Handsworth W.M. Club, ex-pupil teacher—Eng. Hist. (3d)
*899—Vince, William H., 19, Liverpool Inst., clerk—Bkpg. (2d)
1459—Vokes, Thomas B., 22, Southampton Ath., clerk (ordnance survey)—Eng. Hist. (2d)

1304—Wade, George A., Preston M.I., art pupil teacher—Free-hand Dwg. (1st); Geom. Dwg. (2d)
469—Waghorn, John W. W, 18, Devonport M.I., engineer student—Latin, &c. (2d)
862—Wainwright, Henry, 23, Leeds Y.M. Chris. Assoc., clerk—Eng. Hist. (3d)
877—Waldron, Arthur C., 22, Lichfield W. M. Inst., draper's assistant—Arith. (3d)
1135—Walkden, Joseph, 18, Manchester M.I., pawnbroker's assistant—Arith. (3d)
974—Walker, Henry, 18, City of London Coll., clerk—Bkpg. (2d)
*54—Walker, James, 18, Ashton M.I., warehouseman—Arith. (3d)
593—Walker, James, 18, Glasgow Ath., clerk—Bkpg. (2d)
1372—Walker, John, 18, St. Helen's M.I., clerk—Arith. (2d)
596—Walker, John S., 26, Glasgow Ath., clerk—French (1st); Music (1st)
1376—Walker, Thomas H., 16, St. Helen's M.I., Office clerk—Arith. (3d)
277—Walmsley, Thomas, 19, Burnley M.I., joiner—Chem. (3d)
1410—Walters, Thomas, 17, Salford W.M. Coll., warehouseman—Arith. (3d)
293—Walton, Robert, 23, Burnley M.I., weaver—Princ. Mech. (3d)
1099—Warburton, Alfred, 17, Manchester M.I., clerk—Bkpg. (2d)
412—Ward, Charles W., 20, Christchurch W. Men's Inst., tailor—Arith. (1st); Eng. Hist. (3d)
862—Ward, Francis C., 17, Ipswich W.M. Coll., draper's clerk—Arith. (1st); Bkpg. (1st)
1117—Ward, George M., 17, Manchester M.I., engineer apprentice—Arith. (1st); Bkpg. (1st)
1240—Ward, Robert, 28, Glodwick Mut. Imp. Soc., Oldham, machine-fitter, Geom. Dwg. (3d)
1113—Wardrop, Thomas, 22, Manchester M.I., clerk—French (2d)
1039—Warner, Alfred E., 23, Roy. Polyt. Inst., seal engraver—Arith. (1st); French (1st)
1255—Waterston, John, 18, Paisley Artiz. Inst., clerk—Arith. (2d)
579—Watson, Adam, jun., 20, Pop. Evg. Classes, And. Univ., Glasgow, clerk—Bkpg. (3d)
822—Watson, James, 34, Leeds Church Inst., railway ledger clerk—Bkpg. (3d)
637—Watson, John, 17, Glasgow Inst., clerk—Bkpg. (3d)
216—Watson, Thomas B., 20, Bradford M.I., accountant—Light and Heat (3d); Chem. (3d); Anim. Phys. (3d)
1289—Watts, Luther, 18, Portsmouth Dockyard Sch., engineer student—Arith. (1st); Alg. (2d); Geom. (3d)
1560—Webb, George, 19, Messrs. Bagnall's School, West Bromwich, labourer—Arith. (3d); Free-hd. Dwg. (3d)
46—Welsh, Charles, 16, S.E. Railway M.I., Ashford, railway clerk—French (3d)
127—Welwood, Daniel, 17, Belfast Acad., clerk—Alg. (1st) with 2nd prize; Geom. (1st); Eng. Hist. (2d); Arith. (3d)
112—Welwood, Samuel, 16, Belfast Acad., flax dresser—Arith. (3d)
312—Wentzell, Henry T., 32, Burrage-road Schools, Plumstead, book-keeper—Geom. Dwg. (3d)
976—West, John B., 18, City of London Coll., clerk—Arith. (1st); Bkpg. (2d)
43—Wheatley, Nicholas, 17, S.E. Railway M.I., Ashford, smith—Arith. (1st)
34—Wheeler, Mary E., 22, Farnham Y.M. Assoc., teacher—Dom. Econ. (1st)
1089—Whipham, John W. W., 29, Louth M.I., teacher of singing—Music (3d)
470—White, Henry G., 25, Devonport M.I., shipwright Geog. (1st); Anim. Phys. (2d); Conic Sect. (2d); Trigon. (3d)
50—Whitehead, Raymond, 17, Ashton Mech. Inst., clerk—Geom. Dwg. (2d)
382—Whitehead, Thomas, 18, Carlisle M.I., engineer apprentice—Pract. Mech. (2d); Mensur. (3d)
522—Whiteside, Thomas R., 19, Gilford Mut. Imp. Soc., clerk—Arith. (3d)
113—Whitford, Thomas, 18, Belfast Acad., flax dresser—Arith. (2d)
118—Whitford, William, 22, Belfast Acad., flax dresser—Arith. (1st); Alg. (1st); Geom. (1st), with 1st prize; Eng. Hist. (2d)
1409—Whittaker, Charles, 30, Salford W.M. Coll., clerk Bkpg. (2d)
288—Whittaker, John 21, Burnley M.I., warehouseman—Arith. (1st)
1228—Whittaker, Joseph, 26, Oldham Science Sch., joiner—Geom. Dwg. (3d)
54—Whittaker, William, 20, Ashton and Dukinfield Inst., time keeper—Arith. (2d)
60—Whittles, Henry, 18, Bacup M.I., weaver—Chem. (3d)
1424—Wilding, Cuthbert, 21, Salford W.M. Coll., clerk—Bkpg. (2d)
385—Wilkins, William, 20, Chatham M.I., clerk—Bkpg. (1st); Geom. (2d)
297—Wilkinson, William C., 23, Burnley M.I., temporary letter carrier—Arith. (1st); Bkpg. (3d)
1543—Willatt, Sarah Jane, 20, Walsall Ch. Inst., Free-hand Dwg. (3d)
878—Williams, George G., 16, Liverpool Inst., clerk—Arith. (2d); Alg. (3d)

158—Williams, John, 17, Birm. and Midl. Inst., pupil teacher—Arith. (2d)
1579—Williams, John, 17, Wolverhampton Ath., whitesmith—Alg. (3d)
1469—Williams, William H., 23, Southampton Ath., carpenter—Music (2d)
883—Williamson, Jonathan, 21, Liverpool Inst., engineer—Mensur. (3d)
580—Williamson, John, 27, Pop. Evg. Classes, And. Univ., Glasgow, wood carver—Bot. (3d)
977—Willmott, George, 20, City of London Coll., telegraph operator—Arith. (1st); Bkpg. (1st)
1177—Willmott, Robert, 23, New Swindon M.I., engine fitter—Arith. (1st)
1427—Wilson, Edwin, 28, Scarborough M.I., hosier—Arith. (1st)
506—Wilson, James K., 19, Watt Sch. of Arts, Edinburgh, clerk—Arith. (3d)
1250—Wilson, John, 18, Paisley Artizans' Inst., engineer (apprentice)—Arith. (2d)
581—Wilson, John, 28, Pop. Evg. Classes, And. Univ., Glasgow, teacher—Anim. Phys. (3d)
710—Wilson, Joseph, 17, Halifax W.M.C., bookseller—Arith. (1st); Eng. Lit. (2d)
599—Wilson, Robert, 23, Glasgow Ath., clerk—Logic, &c. (2d)
665—Wilson, Robert, 16, Glasgow M.I., stationers' apprentice—Bkpg. (3d)
582—Wilson, Robert A., 20, Pop. Evg. Classes, And. Univ., Glasgow, clerk—Anim. Phys. (3d)
715—Wilson, Thomas, 22, Halifax W.M. Coll., carpet weaver—Bkpg. (3d)
1050—Wilson, William John, 24, Royal Polyt. Inst., engineers' clerk—Anim. Phys. (1st), with 1st prize; Dom. Econ. (1st), with 2d prize
336—Wingfield, Henry E., 17, Burrage-road Schools, Plumstead, engineer student—Geom. Dwg. (2d)
1030—Wittmann, Sidney A., 19, Royal Polyt. Inst., merchant—Germ. (2d); Italian (2d); French (3d)
812—Wolsey, William E., 18, King's Lynn Ath., attorney's clerk—Arith. (1st)
740—Womersley, Frederick W., 27, Hastings M.I., upholsterer—Bkpg. (2d); Alg. (2d)
657—Wood, Alexander, 18, Glasgow M.I., clerk—French (3d)
824—Wood, Edwin, 18, Leeds Ch. Inst., railway clerk—Bkpg. (1st)
720—Wood, William H., 18, Halifax W.M. Coll., clerk—Chem. (1st), with 1st prize
718—Woodhead, David, 21, Halifax W.M. Coll., oilcloth maker—Chem. (2d)
*1376—Woodhead, Joseph, 21, St. Thomas's Ch. Inst. (St. Helen's), assistant teacher—Arith. (3d); Geog. (3d)
45—Woodworth, William R., 16, S.E.Ry. Mech. Inst., railway clerk—Arith. (1st)
1447—Workman, Charles H., 16, Smethwick Loc. Board, glass painter—Arith. (3d); Free-hand Dwg. (3d)
1622—Worrall, William, 25, St. Thomas's School, Woolwich, writer—Geom. Dwg. (3d)
471—Wotton, George G., 23, Devonport M.I., attorney's clerk—Arith. (1st)
1477—Wren, Henry B., 19, Southampton Ath., clerk—Bkpg. (3d)
978—Wright, Frederick, 18, City of Lond. Coll., clerk—Bkpg. (2d)
1628—Wright, Henry E., 22, St. Thomas' Sch., Woolwich, schoolmaster—Geom. Dwg. (2d)
1408—Wright, John, 16, Salford W.M. Coll., hooker—Arith. (1st)
1122—Wright, John, 26, Manchester M.I., traveller—Bkpg. (1st)
1229—Wrigley, William, 21, Oldham Sci. Sch., warehouseman—Geom. Dwg. (3d)
1275—Wroe, James, 27, Swinton M.I., warehouseman—Music (3d)
640—Yorston, William, 21, Glasgow Inst., bookbinder—Free-hd. Dwg. (3d)
1582—Young, Hannah E., 28, Wolverhampton Ath., private schoolmistress—Eng. Hist. (3d)
645—Young, James, 17, Glasgow M.I., apprentice—Arith. (1st)
598—Young, Sydney W., 21, Glasgow Ath., commercial clerk—Eng. Hist. (1st); Eng. Lit. (1st) with 2d prize; Logic, &c. (2d)
583—Young, William, 16, Pop. Evg. Classes, And. Univ., Glasgow, clerk—Bkpg. (3d)

Instances of copying at the Examinations held under the superintendence of the Local Board of the Science School, Belfast, having been detected and reported by two of the Society's Examiners, all the candidates implicated have been excluded from receiving certificates.

Proceedings of the Society.

CONVERSAZIONE.

A Conversazione took place at the South Kensington Museum on Thursday evening, the 23rd inst., when nearly 4,000 members of the Society and their friends were present. The bands of the Scots Fusilier Guards and of the Royal Horse Guards attended and performed selections of music during the evening.

Proceedings of Institutions.

METROPOLITAN ASSOCIATION FOR PROMOTING THE EDUCATION OF ADULTS.—The fourth annual gathering for athletic sports will be held at the Crystal Palace, on the 1st July next, to commence at half-past one o'clock punctually. The sports will include flat races, 100 yards, 300 yards, and 500 yards, and one mile, throwing the cricket ball, running high jumps, running long jumps, hurdle races, putting the stone, throwing the hammer, a sack race, 100 yards, concluding with a consolation hurdle race of 200 yards with ten hurdles. The prizes vary from 5s. to 15s. Members of Institutions connected with the Metropolitan Association who intend to compete must send in their names to the Secretary of the Institution to which they belong on or before June 24th. Referees and umpires will be appointed by the committee. No prize will be given unless at least five duly qualified candidates contend for it. Not more than four members of any one Institution will be allowed to contend for each separate event. These sports being solely intended to give encouragement to exercises of strength and skill among the members of the Institutions in Union with the Association, professionals, or any whom the referees may deem ineligible, will be rigorously excluded. There will be the usual attractions of the Crystal Palace, with a balloon ascent, singing by a choir of 300 voices, brass bands, &c.

THE PARIS EXHIBITION.

There are few of the classes on the English side better filled than that which includes ores and minerals, rough iron, and other metals, tools, china clay, fire bricks, tea-trays, nails, pins, needles, and buttons. The space was totally inadequate to the number of exhibitors, so that several sections have necessarily been split in two, and placed part in this court and part in that of machinery; iron tubes, springs, buffers, iron gates, nuts and bolts afford instances of this. A similar remark will apply to carpets, which, for want of wall space elsewhere, are

placed in the machinery court, where also are, in this case according to the classification, carriages, saddlery, harness, fishing tackle, archery appliances, crucibles, and filters. Those who wish to examine all the specimens of British floor cloth, must not omit to pay a visit to the food department, which is also an appendage of the machinery court.

The British section of class 40,—"Raw materials produced by extraction and their products," contains a choice collection, more remarkable for intrinsic goodness than for quantity or show; the ores are generally well chosen and well arranged; of other minerals there are scarcely any except china clay, which is said to be in demand in France, and coal, which is largely represented. The exhibitors of raw iron, steel, railway and other shaped iron and steel, wheels and axles, specimens of rivetted work, iron and tinned plates, copper in every form, lead, tin, and their compounds, tubes, joints, machine-made bolts and nuts, wire and wire-work are numerous, and most of the specimens exhibited interesting. There is also a fine though not a large show of cutting and other tools, saws, files and springs, and cut-steel goods, corkscrews and similar articles being placed here, and not with cutlery, in the furniture group.

One of the finest illustrations of a grand industry is the collection of ores, metal, and drawings of the great Northumberland and Durham (W.B.) lead works, arranged by a gentleman well known, and formerly a member of the Council of the Society of Arts, Mr. Thomas Sopwith. These works extend over about two hundred square miles, and produce from 8,000 to 9,000 tons of lead per annum. The chart of the works shows the seven-mile level, from Allendale to Allenheads, opened eight or ten years since, and the strata and workings are well illustrated by diagrams. The minerals of the district are arranged in scientific order.

Another exhibition which attracts great attention is that of Messrs. Matthey and Johnson, of Hatton-garden, who show two of the finest platinum apparatus for the rectification of sulphuric acid in the exhibition, besides a number of smaller apparatus and ingots of the same metal, several beautiful arrangements for analytical operations, and a rare collection of preparations of the precious and rare metals. The contents of Messrs. Matthey and Johnson's cases are said to be of the value of £20,000.

While on the subject of metals, machinery, and hardware, it will not be out of place to pay a visit to the waterside, where Great Britain has a noble exhibition of marine engines, apparatus, and nautical objects of various kinds. This portion of the exhibition is easily reached by passing under the quay, either beneath the steel bridge near the French lighthouse, or by the tunnel on the English side. The visitor will there find two large ranges of buildings, one occupied by the French the other by the English commission; on each side there is one large shed devoted to marine engines and apparatus, and both are admirably filled, well arranged, and well lighted. On the French side there are more large actual machines than on the English.

The Admiralty and the Trinity House are splendidly represented at the exhibition, but a portion of the contributions of the former, including artillery and nearly the whole of those of the latter establishment, are not here, but in the machine court, within the main building or in the park. The Admiralty has sent an extensive series of models of about eighty vessels belonging to the navy, to illustrate British ship-building since the introduction of the screw propeller. They include vessels of all classes—two and three deckers, frigates, corvettes, gun boats, iron-plated ships, turret ships, dispatch boats, and transports, and all are made to the same scale, namely, a quarter of an inch to the foot, and exhibit a strange variety of form, showing how the necessities of the service and the views of ship-builders have modified the lines of our floating castles. The Board of Admiralty also shows a fine pair of marine engines, of 350 horse-power, on the expansive principle, with surface condensers, made by Messrs. Penn and Son, of Greenwich, for H.M.S. *Sappho;* a model of the engines, of 1,350 horse-power, made by the same firm for the *Minotaur* and the *Northumberland;* and a launch engine and boiler complete, also by Penn and Sons. The board also shows the engines of a steam launch in their place in the little craft; these consists of two pairs of high-pressure engines, of the total nominal power of six horses, manufactured by the firm of Maudslay, Sons, and Field.

The launch in which those engines are fixed is 42 feet long by 11ft. 6in. broad, and the swift movements of the little craft on the Seine, and the readiness with which she is manœuvred with the aid of her twin screws, call forth great admiration. She carries a rifled 12-pounder at her bow, to show her quality as a member of the Royal Navy of England.

Besides this steam launch, there are exhibited a small pinnace, a cutter, jolly-boat, dingy, gig, and various kinds of life-boats.

The Admiralty shows a fine collection of models illustrative of the system of construction of iron ships, and of the general fittings of men-of-war; specimens of the food prepared by the Government itself for the use of the navy, and a collection of flags, charts, books, &c.

The collection of models exhibited by Captain Coles, R.N., Messrs. Napier, Laird, White, the ship-building companies, and other establishments, is large and fine, and makes an admirable pendant to the series of Admiralty models.

Amongst the large number of interesting objects contained in these sheds must be mentioned the new code of international commercial signals, the series of diagrams illustrative of the regulations of Lloyd's register, and a noble life-boat, rocket apparatus, rafts, and all kinds of arrangements for the saving of life from shipwreck.

The British Commission has established a lighter for the convenience of passing to and from the boats, and in a short time there will be a crowd of yachts and boats of all descriptions around it.

Other nations have some specimens of naval construction in the water here, amongst which are six or more steam launches.

A new object of interest has recently appeared in the centre of the exhibition; in the inner garden is a polygonal building, the upper story of which is destined to receive the crown jewels of France; the lower portion of this pavilion is devoted to the exhibition of the money, weights, and measures of all the exhibiting nations, each occupying a compartment of the polygon, and in the same order as the sectors of the main building devoted to them.

The number of persons visiting the exhibition is now very large, although the weather for some time has been far from attractive. There has, however, been an improvement in the latter respect, and a corresponding increase of numbers, during the last few days.

OPENING OF THE GALLO-ROMAN MUSEUM AT SAINT GERMAIN.

A considerable portion of this fine old château has been restored in the spirit of the original plan of the time of François Premier, thus sweeping away the whole of the additions made by Mansard in the time of Louis XIV. The new portions—for they are almost rebuilt—give an excellent idea of a stronghold of the renaissance, although the form is peculiar, being that of a pentagon, instead of the more common parallelogram. When completely terminated—a work which will occupy a dozen years at least—the structure will have a very imposing effect.

The museum was opened by the Emperor on the 12th instant. The following account of its contents and arrangement is abstracted from the *Moniteur des Arts*:—

In the first *salle* are collected specimens of wrought flint articles, found with bones of extinct species of animals; bones carved, engraved, hollowed, and otherwise fashioned for religious or domestic purposes by the hand of man; a fine collection of flint weapons, presented to the Emperor by the King of Denmark; objects obtained from the sand of the basin of the Seine; and the discoveries of M. Boucher de Perthes in the valley of the Somme.

The second *salle* is devoted to megalithic sepulchral monuments, the dolmens, monoliths, and other works of the first age of stone construction, together with the more artistic flint weapons, and bone instruments, and the first rude specimens of the potter's art of France. These objects are classed by groups, according to the provinces from which they are derived; and opposite the cases which contain them are models, one-twentieth of the real size, of the principal dolmens of the period beneath which the greater portion of these relics have been found.

The third *salle* is entirely occupied by one of these reproductions, although the model is on the scale already named; this is the celebrated Tumulus Dolmen of Gavrinis. Who shall decypher the mysterious characters engraved on the granite of the inner walls of this antique structure? Who shall find the key to these hieroglyphics, the strange turns and contortions of which resemble somewhat the primitive sculptures of India or the decorations of Central America?

The fourth *salle* contains Gallic inscriptions and medals, and is the last of the series at present open on the lower floor. Access is obtained to the upper story by means of the staircase of François I., which M. Eugène Millet, the architect, has restored with great taste and skill.

In the first *salle* above is the collection of Lacustrine antiquities. The age of stone has not exhausted its productions, for here we find flint hatchets, arrow heads, knives and tools, with implements made of bone, tortoiseshell, and hard woods; but the era of bronze begins to show its works. Stone gives place to bronze, and we find swords, hollow hatchets of various forms, collars and necklaces; large poignards have taken the place of javelins and other weapons of that class, as the tomahawk or club of the savage. The nearer we descend towards the historic period, the more numerous become those relics of the Helvetian lakes. Not only has bronze triumphed over time, but by its side are to be found the most fragile, humble, and apparently the most ephemeral utensils of domestic life, such as fragments of woollen garments and fabrics, fishing nets, hunting apparatus, small objects of the female toilet, and even specimens of human food, such as grains of wheat and barley, preserved by some curious accident.

Another *salle* is devoted to the Gallic period of the time of Brennus, and contains numbers of casques, pieces of armour, for the chest, arms, legs, and other parts of the body, bucklers, belts, arrows, swords, and fragments of all kinds, together with a certain number of useful domestic and other implements.

The adjoining *salle* is devoted to Celtic productions, in which the peculiar taste, fancy, and workmanship of various tribes become apparent; the objects in this department of the museum exhibit the patient work of the ancient inhabitants of the soil, and exhibit in their diverse forms the individuality of the various tribes disseminated over the Celtic soil, the mark, the signature, as it were, of their producers.

The last division is to be devoted to the period of the Roman conquest, but this portion of the museum is not yet completed. It is destined to illustrate not only the Roman conquest, but the domination of the ancient conquerors of the world, and is to contain plans in relief of the principal sieges undertaken by the conqueror of the Gaul, with the original, or, in their absence, *fac-similes* of the arms, machines, engines, and weapons employed —a practical commentary on the "Commentaries."

The new museum has been opened to the public, and its doors will, in future, remain open on Sundays, Tuesdays, and Thursdays, between the hours of eleven and five. It will, however, only be actually closed on Saturdays and Mondays, Wednesdays and Fridays being devoted to study, on which days students, and especially foreign students, will have no difficulty in obtaining an admission.

The museum of St. Germain is an important addition to the attractions of Paris, especially for the archæologist.

Fine Arts.

Kensington Museum.—The plaster cast taken by Signor Brucciani from the portal della gloria of the Cathedral of Santiago, Spain, has been temporarily put up in the Kensington Museum. It is difficult to overestimate the interest and value of this magnificent work, executed by Master Matthew, a native Spanish sculptor, about the year 1188. The student of architecture and of ornamental art will recognise in this portal—which is supposed to have been wrought as well as designed by Master Matthew—a combination of diverse historic schools. The draperies and the type and treatment of the figures are in some parts Byzantine, yet the Romanesque and Lombardic style is dominant in the rude vigour of the handling, in the naturalism of the forms, and in the bold use of the grotesque. The insertion of griffins and other monsters at the base of the columns is characteristic of churches in Verona and other cities in Northern Italy. Mr. Street has engraved this grand portal as a frontispiece to his volume on "Gothic Architecture in Spain." He describes the Cathedral of Santiago as of "extreme magnificence and interest." Of the triple portal now reproduced in the Kensington Museum, Mr. Street writes as follows:—"It is now necessary to say something about what is to an architect the chief glory of this noble church—its grand western entrance, fitly called the Portico della Gloria. On the whole, with no small experience to warrant my speaking, and yet with a due sense of the rashness of too general an approval, I cannot avoid pronouncing this effort of Master Matthew's at Santiago to be one of the grandest glories of Christian art." The most remarkable portions of the work are the tympanum and the archivolt. Round the latter are ranged figures of the four-and-twenty elders that encircle "The Last Judgment," which occupies the tympanum. More correctly speaking, however, this bas-relief represents, not "The Last Judgment," but "Christ in Glory;" hence the name which the portal bears, "Della Gloria." The treatment of the subject accords with prescribed art, or rather ecclesiastical custom—Christ in the centre, the emblems of the four Evangelists attendant around, and beyond angels and the multitude of the heavenly host. Lady Eastlake records the fact that "Christ in glory is seen frequently over the side doorway of early Gothic churches of the 11th and 12th centuries." Mr. Street considers it probable that the entire portal was the handiwork of Master Matthew, unaided by assistants. He assigns a period of twenty years to its execution; the same time was taken by Ghiberti in the execution of his famed bronze doors to the Baptistery in Florence. Mr. Street sees in Master Matthew's work both conformity to custom and precedent, and yet freshness and originality. It is interesting to know that the same qualities are present in the works of the Pisani in Italy, and that from the same causes. Art was in both instances alike in transition from conventionalism and tradition to nature. The execution has the vigour, and even the rudeness, which usually accompany the struggle for independence. Mr. Street reports that on the original portal "traces everywhere remain of the old delicate colouring with which the sculpture was covered." This plaster cast from Santiago, acquired for Kensington, may be followed as it has been

preceded by other like reproductions. The cost, which is considerable, is expended in the cause of art education. The general policy of the department in this matter was indicated by Mr. Cole, in the discussion which ensued on the paper read by Mr. Fergusson before the Society upon Indian Architecture. Mr. Cole then said "the public money had been already employed in obtaining casts of the finest objects in Italy, Spain, and France. We had recently imported into this country, at a cost of between £2,000 and £3,000, a cast of the beautiful gate of the convent of Santiago, in Spain; and, if we were to have these casts from Spain, it would be well to have them from India also. This was the more important when it was recollected how rapid was the destruction of such works in that country."

Arundel Society.—This society has been seeking to promote the knowledge of art in some new channels. In addition to its usual reproductions from pictures, it has latterly been anxious to lead the way in the publication of faithful memorials of Italian monumental works. All students know that some of the most valued products of Italian art take the form of sepulchral monuments. These architectonic and sculpturesque works are often not only masterpieces for modelling, but also frequently admirable as polychrome decoration. Hence it has been thought that the process of chromo-lithography would enable the Arundel Society to give at once trustworthy and popular reproductions of monuments, which, though long renowned, remain necessarily unknown to the general public. Drawings, both pictorial and to scale, have been made for the approval of the Council. It may also be mentioned that in the Society's rooms, Bond-street, have been on view for some time past, accurate water-colour copies of the several compartments of John Van Eyck's masterpiece at Ghent, "The Adoration of the Lamb." The Council propose shortly to enter on the arduous labour of reproducing this famed work through the medium of chromo-lithography.

College of Applied Art, Paris.—It will be remembered that out of the fine exhibition of decorative works prepared by the Union Centrale des Beaux Arts, and held in the Palais de l'Industrie in the year 1865, there arose a proposition to create a regular college for pupils in the applied arts, which was announced at the time in the *Journal*. The first step was then taken towards the realization of the project by the purchase of a piece of ground for the intended college in the Avenue Philippe Auguste, between the Quartier Saint Antoine and Vincennes. The suggestion received the sanction of the Minister of Public Instruction, and, we believe, of the Emperor, and it is now stated that the preliminary measures have been taken, and that the establishment of the new college will be proceeded with without delay. The intention is to give to the youth of all classes intended for the artistic industries a thorough classical and literary education (classical in the art sense, probably, only), and at the same time to afford them full opportunities of practising the manual operations connected with applied art. The college will receive both boarders and out-of-door scholars. The establishment is to include special museums devoted to each of the great epochs of the history of art, that is to say, of antiquity, of the middle ages, of the renaissance, and of the four Louis, ending with the sixteenth; also a museum of Eastern art, and a library. In addition to these there are to be conservatories for ornamental plants; a department of artificial plants and flowers, for the study of arrangement; cabinets of physics, chemistry, natural history, &c.; a museum of contemporary art, in which will be exhibited at certain seasons specimens of the most remarkable works of the day. Lastly, besides schools for the daily study of drawing, painting, modelling, carving, &c., there will be a number of ateliers which will be accorded gratuitously to the first artists in each class on condition that they allow the pupils to be present during certain fixed hours of the day, when they are engaged in producing works which are to serve as models for industrial art. Six of these ateliers are already decided on, namely—one for modelling and carving of the human figure and animals, to be presided over by M. Barye, a very able sculptor; an atelier for chasing metals, and the manufacture of goldsmiths' work and bronzes—the brothers Fanniere; one for the decoration of porcelain, faïences, and enamels—M. Claudius Popelin; another for designs for paper-hangings—M. Poterlet; a fifth for decorative painting—M. Moynet; lastly, an atelier for composition and decoration of fabrics, carpets, and furniture; to which no name is yet attached. The scheme is to construct the college to receive 500 resident pupils, and 100 students, with separate chambers. The duration of the course of study is proposed to be fixed at six years, with a uniform charge for pupils of all ages of 1,700 francs per annum. It may be mentioned in addition that the society also intends to maintain its present museum and gratuitous conferences in the Place Royale, for the benefit of those actually engaged in artistic industries. The projectors and supporters of both establishments are Parisian manufacturers or art designers, aided by the Minister of Public Instruction and the Marquis de Mornay.

Commerce.

Sugar and Coffee in Brazil.—Mr. Consul Morgan, in his commercial report on the trade of the port of Bahia (Brazil) for the year 1866, states that sugar, though formerly almost entirely the product of slave labour, does not appear to have suffered from the complete abolition and cessation of the slave traffic, seeing that the exports of last year amounted to fully 48,000 tons, whilst the average of the preceding twenty-five years was only about 41,000 tons. Of the total amount exported, about 36,000 tons went to great Britain, or a channel port for orders; 1,200 tons direct to France; 2,700 to Sweden; 2,700 tons to Portugal; 3,000 to the United States; and the remainder to the River Plate, Holland, Germany, and Spain. The proportion of the different qualities of sugar produced has considerably altered of late; planters have found out that it is not worth their while to make the better qualities, the difference not paying for the trouble and delay, and now but seldom take the pains of claying their sugar—another confirmation of the mischievous effect of the scale of sugar duties, in not only destroying motive for improvement, but in actually inducing the planters to make inferior sugars. In consequence of this, less than one-fourth of the whole crop now consists of "whites," about one-fourth of "clayed browns," and above one-half is raw sugar. The crop of coffee for the year 1866 was considerably below that of 1865, being only 69,200 bags,* against 99,700 bags in 1865; but still the crop was an average one, the returns of the last twenty years, from 1846 to 1865, giving an average of only 43,201 bags. The value of coffee has been less affected than other articles, the price throughout the year having ruled from 5·250 dollars to 5·600 dollars per arroba, the average price being 5·400 dollars per arroba. This does not include "washed" coffee, which only comes to market in very small quantities, and is mostly shipped to France. Of the 69,200 bags exported, 33,000 were sent to France; 13,700 bags to Great Britain and to the Channel for orders; 9,400 bags to Gibraltar for orders; 4,800 to Germany; 4,300 to Genoea; 2,700 to Portugal, partly Lisbon, for orders; and 1,200 to the United States.

Sugar.—The proportion of each description delivered for home consumption at the port of London in the first sixteen weeks of the year 1867 has been as follows:—British West India, 27,266 tons; Beetroot, 6,475 tons; Manila, 5,036 tons; Cuba Muscovado, 4,515 tons; Havana, 4,060 tons; Porto Rico, 3,050 tons; Madras,

* A Bahia bag of Coffee contains 4 arrobas, or 128lbs., whilst at Rio de Janeiro a bag contains 5 arrobas, or 160lbs.

2,735 tons; Mauritius, 2,696 tons; Penang, 1,451 tons; Brazil, 1,338 tons; Bengal, 1,291 tons; Java, 19 tons; total, 59,932 tons.

Colonies.

POSTAL COMMUNICATION.—The postal conference of representatives of different colonies, which met at Melbourne, has come to the following decision:—"That, in order to establish a postal system affording regular fortnightly communication by three lines, *viâ* Brisbane and Torres Straits to Singapore, *viâ* Melbourne and South Australia to Suez, and *viâ* New Zealand to Panama, with the necessary branch services, the six colonies represented at this conference should contribute a moiety, not exceeding £200,000, of the total cost, in the following proportions, viz.:—Victoria, one-fourth; New South Wales, one-fourth; New Zealand, one-fourth; Queensland, one-seventh; South Australia, one-twelfth; Tasmania, one-fiftieth." According to this, the three first colonies will have to pay £50,000 each, and the remaining £50,000 will be divided between the other colonies as follows:—Queensland, £28,571; South Australia, £16,666; and Tasmania, £4,000. As regards Western Australia, the conference decided that, as there was no representative present, the contribution of that colony to the postal service should remain as before. The next important matter was the question of routes, upon which a series of resolutions were agreed to. Their purport is as follows:—The Adelaide mails, by the Suez line, to be delivered by the ocean steamer at Kangaroo Island, and conveyed to and from that island and Port Adelaide by a branch service. Branch steamers are also to leave Melbourne and Sydney for Adelaide and Tasmania on the arrival of the Panama and Singapore steamers. The whole of the branches are to be done at a speed of not less than nine miles and a-half per hour, and the several branch steamers are to take their departure on the outward journey within six hours of the arrival of the trunk-line steamer; whilst, if necessary, they are to await her arrival for a period not exceeding three days beyond the date of her being due.

THE MANUFACTURES OF NEW SOUTH WALES.—The total population of the colony of New South Wales is about 430,000, chiefly engaged in gold mining, coal getting, agriculture, pastoral pursuits, and commerce. Notwithstanding the limited labour-market, there have sprung up in this colony more than two thousand manufactures and works of various kinds. Some of these are connected with, and dependent on, agriculture; as the manufacture of hay-pressing, reaping, and chaff-cutting machines. Then there are boiling down establishments, soap and candle manufactories, and other places where the raw materials produced by the pastoral interest are worked up. There are also three distilleries, sugar refineries, and breweries. There are upwards of 300 places for plastic manufactures and the production of building materials. There are about a hundred works for brass, iron, lead, and the manufacture of machines. The manufacture of boots and shoes by machinery near Sydney employs many hands; and there is a large variety of miscellaneous works, the number of which will advance naturally as population increases. A great proportion of clothing too is made in the colony. It is a significant fact that while the population has increased about one-third during the last ten years, the manufactures and works have increased sevenfold.

Notes.

BRITISH ASSOCIATION OF GAS MANAGERS.—The fourth annual general meeting of the members of this association will be held at the School of Art, Waverley-street, Nottingham, on Tuesday, Wednesday, and Thursday, the 11th, 12th, and 13th June. Thomas Hawkesley, Esq., C.E., President of the association, will occupy the chair. On the Tuesday, at the morning meeting, at twelve o'clock, an inaugural address will be delivered by the president. At the evening meeting, at seven p.m., a lecture will be given by Dr. Letheby, on "The Utilisation of the Residual Products of the Manufacture of Coal Gas, with especial reference to the Production of Aniline Colours from Coal Tar." On the Wednesday the chair will be taken at eleven a.m.; various papers and communications will be read. At five p.m. the members will dine with the President, at the George Hotel, Carlton-street. The Thursday will be occupied by visits of the members to various works and places of interest in Nottingham and the neighbourhood.

THE INTERNATIONAL CONGRESS OF ANTWERP.—This meeting is appointed to open on the 25th of August, and to close on the 1st of the following month. The meetings will be under the honorary presidency of the Minister of the Interior, and will take place in the rooms of the Royal Society of Harmony, on the Place of the old canal at Antwerp. The congress will coincide in time with the triennial exhibition of works of art and with the communal *fêtes;* it is said that nearly all the historical and archæological celebrities have inscribed their names as members of the congress, and that the greater part of the European governments have appointed official representatives. The King of the Belgians has promised to attend the congress in person. It may be convenient for the members of the Society of Arts and the readers of the *Journal* to know that adhesions are to be addressed to the Secrétaires-Généraux, 19, Rue du Mai, Antwerp.

MEETINGS FOR THE ENSUING WEEK.

MON.....Odontological, 8.
R. Geographical, 8½. Mr. A. G. Findlay, "On Dr. Livingstone's Last Journey in relation to the Sources of the Nile."
R. United Service Inst., 8½. Capt. A. Moncrieff, "Further Particulars regarding Moncrieff's Protected Barbette System."
Entomological, 7.
British Architects, 8.
Victoria Inst., 8.
Royal Inst., 2. General Monthly Meeting.

TUES ...R. Horticultural, 3. General Meeting.
Royal Inst., 3. Prof. Miller, "On Spectrum Analysis."
Anthropological, 8.
Geologists' Assoc., 8.

WED ...Society of Arts, 8. Mr. J. B. Denton, "On the Water Supply of the Metropolis in relation to the Conservancy of the Thames and its tributaries, and the demands of the Water Companies."
Geological, 8. 1. Mr. D. Mackintosh, "On some striking Instances of the Terminal Curvature of Slaty Laminæ in West Somerset." 2. Prof. H. B. Medlicott, "The Alps and the Himalayas: a Geological Comparison." 3. Mr. Searles V. Wood, jun., "On the Post-glacial Structure of the South-east of England."
Obstetrical, 8.

THUR ...London Inst., 7. Prof. Bentley, "On Botany."
Royal Inst., 3. Prof. Huxley, "On Ethnology."
Antiquaries, 8½.
Linnæan, 8. 1. Sir John Lubbock, Bart., "On the *Thysanura*" 2. Dr. Pettigrew, "On the Mechanical Appliances by which Flight is attained in the Animal Kingdom." 3. Mr. R. Spruce, "On Insect-migrations in South America."
Chemical, 8. Sir B. C. Brodie, "Mode of Representation afforded by Chemical Calculus."
Royal Society Club, 6.

FRI .....Philological, 8.
Royal Inst. Mr. Ruskin, "Present State of Modern Art, &c."
Archæological Inst., 4.

SAT .....Royal Inst., 3. Prof. Huxley, "On Ethnology."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb. *Delivered on 21st May*, 1867.

151. Bill—Commons Inclosure Act Amendment.
161. ,, Water Supply.
162. ,, Pier and Harbour Orders Confirmation (No. 2).

The "Tornado"—Correspondence (Part VII.) (corrected pages).
Education—Return.
Manufactures, Commerce, &c.—Reports by Her Majesty's Secretaries of Embassy and Legation (No. 4, 1867).

Delivered on 22nd May, 1867.

137. Bill—Galway Harbour (Composition of Debt).
165. ,, Habeas Corpus Suspension (Ireland) Act Continuance (No. 2).
268. Metropolitan Local Government, &c.—Second Report.
Public Petitions—Twenty-fourth Report.

SESSION 1866.

442. (c) Poor Rates and Pauperism—Return (C).

Delivered on 23rd May, 1867.

102. Bill—Industrial Schools (Ireland) (amended).
117. ,, Limerick Harbour (Composition of Debt).
157. ,, Public Records (Ireland).
159. ,, County Treasurers (Ireland) (amended).
163. ,, Pier and Harbour Orders Confirmation (amended).
73. (v.) Railway and Canal Bills—Sixth Report.
101. (i.) London, Chatham, and Dover Railway Company—Account.
118. (ii.) Gas (Metropolis)—Correspondence.
181. Army (Whitworth Rifles)—Return.
206. (i.) Storm Signals—Return.

Delivered on 24th May, 1867.

164. Bill—Railway Companies (amended).
167. ,, Local Government Supplemental (No. 2).
304. Habeas Corpus Suspension (Ireland) Act—Returns.
307. Church of England and Ireland in the Colonies—Despatch.
Digest of Law—First Report of Commissioners.

Delivered on 25th May, 1867.

261. Royal Commissions—Return.
263. Merchant Ships—Correspondence.
286. Courts of Probate (London and Dublin)—Account.
314. Exchequer Bonds—Account.
Army (Transport and Supply Departments)—Report.
Public Petitions—Twenty-fifth Report.

Delivered on 27th May, 1867.

152. Bill—Agricultural Children's Education.
287. Sir John Port's Hospital and School—Report.
291. Prisons—Returns.
293. Tithes—Return.
295. Army (Material of War)—Return.
305. Parliamentary Boroughs—Returns.
Rivers Pollution—Second Report of Commissioners (River Lea), Vol. 1.
Turkey and Greece—Reports relating to the Condition of Christians.

Delivered on 28th May, 1867.

156. Increase and Diminution (Public Offices)—Abstract of Accounts.
266. Disasters at Sea—Memorials, &c.
319. Police (Scotland)—Ninth Report of Her Majesty's Inspector of Constabulary.

Patents.

From Commissioners of Patents' Journal, May 24th.

GRANTS OF PROVISIONAL PROTECTION.

Automaton figures, &c.—1334—J. S. Cavell.
Bale fastener—1358—W. R. Lake.
Balloons—1392—W. Smyth.
Bedsteads, &c.—1293—E. Krieghoff.
Beer, &c., apparatus for storing—1289—C. Ritchie.
Beer engines—1297—J. Holmes.
Boilers, preventing explosion of—1368—G. H. Cail.
Books, &c., parcel—1296—G. F. Millin and E. J. Potter.
Boots and shoes—1265—J. H. Johnson.
Bottles, cleaning—1372—M. Fleming.
Breaks, railway—1338—R. Marsden and U. Bromley.
Bricks, &c., manufacturing—1316—T. R. Crampton.
Bridles—1192—W. R. Lake.
Buffers—1328—G. Wilson.
Carpet sweeping apparatus—1197—S. P. Worth.
Carriages—1322—K. J. Winslow.
Carriages, &c., railway—1304—H. Allman.
Casks—1380—C. Ritchie.
Cast-iron, conversion of—1295—J. Heaton.
Chlorine, &c.—133—W. Weldon.
Clocks—1394—C. Marlow.
Coal, &c., apparatus for getting—1311—T. W. Bunning and W. Cochrane.
Coal, &c., distillation of—284—J. Buhrer and A. P. Price.
Coal mining machinery—1388—C. Jones.
Coffee, apparatus for making infusions of—1281—F. Walton.
Corn, &c., grinding—1172—A. Rigg.
Cotton, preparing—1152—J. Galloway and T. Settle.
Dampers—1325—W. Schofield and E. Smith.
Dials—1201—J. Raywood.
Doors, securing the handles of—1352—J. Crockatt.
Drying machines—1267—J. L. Norton.
Engines, rotary—1398—G. F. Russell.
Engines, steam—1390—C. H. Trask.
Fabrics—1310—J. Hemsley.
Fabrics, textile—976—R. Wolstenholme.
Fire, apparatus for giving alarm in cases of—1302—T. Crossley
Fire-arms—1259—J. J. Kraffert.
Fire-arms, breech-loading—1165—C. De Tivoli.
Fire-arms, breech-loading—1255—C. De Grelle.
Fire-arms, breech-loading—1299—J. G. Rollins.
Flour—1386—J. Norman and W. Hay.
Fluids, measuring the flow of—1303—C. B. Reitz.
Fortifications, construction of—1271—J. Brown.
Fountains—1320—J. Nadal.
Gas—1382—G. McKenzie.
Gases—1356—C. D. Abel.
Grain, cleaning—1346—W. R. Lake.
Gun-barrels, &c.—1253—J. Marshall.
Hay cutters—1263—J. Howell.
Hoes—1354—J. and A. Fairley.
Hoop iron—1249—E. Deeley.
Lamps—1038—W. Clark.
Lamps—1301—T. Crossley.
Lamps—1315—P. Brash and W. Young.
Lamps, means of lighting—1330—J. H. Johnson.
Locks—1326—W. R. Lake.
Locomotives—1285—J. H. Johnson.
Looms—1269—E. B. Bigelow.
Looms—1274—H. A. Bonneville.
Looms—1324—W. Clark.
Lubricators—261—F. Jossa.
Lubricators—1378—W. E. Newton.
Metallic surfaces, coating—1342—J. B. Blythe.
Millstones—1245—G. Davies.
Motive-power apparatus—1314—J. Baker.
Motive-power, manual—1336—G. Harthan.
Needles—1318—B. H. Smith.
Nets, trawl—1332—S. E. Hallett.
Nutmeg grater—1287—W. R. Lake.
Oils, apparatus for burning hydro-carbon—1329—T. Crow.
Palisades—1257—A. Louet.
Pipes, colouring tobacco—1132—J. S. Brooks.
Rails, &c.—1327—G. Wilson.
Ratchet levers—1360—T. A. Weston.
Rollers—1219—J. and C. Moseley.
Sails, securing—1323—R. Taylor and E. Poulson.
Screw propellers—1247—H. S. Swift.
Sewing machines—1251—T. Webb.
Signal lights, magneto-electric—1308—J. H. Johnson.
Signals, railway—1230—R. F. Chapman.
Steel, &c., manufacture of—1122—J. Hargreaves.
Stillages—1317—W. Bradbury.
Swimming, &c., apparatus—1396—J. Reilly.
Telegraph posts, &c.—1319—P. Haenlein and J. and R. G. Fisher.
Telegraph wires, apparatus for laying, &c.—1307—L. Delperdange.
Telegraphs—1279—C. D. Abel.
Valves—1384—W. Bracewell, W. Pickup, and B. Lund.
Valves—1102—J. Shore.
Wagons—1273—J. and J. Lomax.
Waistcoats—1370—G. Sims.
Weeding apparatus—1312—H. A. Bonneville.
Wrappers—1090—J. W. Wallis.
Writing, apparatus for facilitating learning—1276—H. A. Bonneville.
Yarns—1145—G. Ripley.
Yarns—1283—G. A. J. Schott and J. S. Rosenthal.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Fire-arms, breech-loading—1449—J. H. Johnson.
Gases—1448—G. T. Bousfield.

PATENTS SEALED.

3107. J. E. Boyd.
3117. C. Crockford.
3120. J. H. Atterbury & S. Woolfe.
3152. W. Clark.
3254. R. Clayton, J. Raper, J. Goulding, and W. Howarth.
3314. A. V. Newton.
3401. W. Bradburn.
3428. F. Leonardt.
318. S. L. Lucena.
646. W. Clark.
669. J. E. Asselin.
858. H. Fassmann.
975. H. A. Bonneville.

From Commissioners of Patents' Journal, May 28th.

PATENTS SEALED.

3137. J. Wadsworth.
3139. E. Hughes.
3143. J. Field.
3149. H. Bateman.
3158. J. Ramsbottom.
3167. J. Nuttall.
3171. J. T. A. Mallet.
3174. B. J. B. Mills.
3184. J. Broadbent.
3193. T. Bayley and J. Taylor.
3233. C. E. Samuelson.
3244. H. Dines.
3259. W. E. Newton.
3266. V. Gallet.
418. T. Greenwood & J. Keats.
745. J. Westwood and R. Baillie.
769. A. V. Newton.
783. J. Robinson.
864. W. E. Newton.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

1274. E. A. Cowper.
1314. D. Clark.
1307. H. Redfern.
1349. J. Young.
1306. G. Davies.
1294. W. Clark.
1299. W. Law.
1357. G. E. Dering.
1311. C. Boutet.
1474. W. E. Newton.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

1247. J. Craig.
1272. M. Cavanagh.
1288. W. Baker.
1308. S. Chatwood.
1316. H. Moule and J. Bannehr.

Journal of the Society of Arts.

FRIDAY, JUNE 7, 1867.

Announcements by the Council.

The Late Sir Thomas Phillips.

At a meeting of the Council on Monday last, the 3rd instant, the following resolutions were passed :—

Resolved—"That the Council desire to record their deep regret at the death of their much esteemed and excellent chairman, Sir Thomas Phillips, whose long and valuable services as a member of this Council, and as its chairman for several years, have largely contributed to promote the interests and usefulness of this Society.

"That a copy of this resolution be sent to Mr. William Page Phillips (nephew of the late chairman), together with the expression of condolence and sympathy of the Council with him and the rest of Sir Thomas Phillips' family."

Annual Conference.

The Sixteenth Annual Conference between the Council and the Representatives of the Institutions in Union and Local Boards will be held on Wednesday, the 19th June, at Twelve o'clock, noon. The Right Hon. Henry Austin Bruce, M.P., will preside.

The Council will lay before the Conference the Secretary's Report of the Proceedings of the Union for the past year, and the Results of the Examinations, and the Programme of Examinations for 1868 will also be considered by the Conference.

The following suggestions of Subjects for Discussion have been received from various quarters, it being understood that in putting them forward the Council express no opinion whatever upon them :—

1. Whether the means at present available for the promotion of Primary Education are sufficient to qualify the working classes to take advantage of the Secondary Instruction offered by Institutes to Adults ?

2. Whether provisions should be inserted in the Manchester Education Bill, now before Parliament, which would authorize grants to be made to Evening Schools and Classes ?

3. Whether, considering the valuable results of the co-operation which the Royal Horticultural and Geographical Societies, and certain public companies, have afforded to the Society of Arts in extending the sphere of its Examinations, the like co-operation cannot be obtained from other societies and companies, especially from the Royal Agricultural and Botanical Societies ?

4. Whether any additional means can be devised to induce the Institutions to form District Unions, with paid Visiting Officers, in connexion with the Society of Arts ?

5. Whether additional interest in the Final Examinations might not be excited by the establishment of Special Prize Funds in the District Unions, to which Supplementary District Prizes might be added by the Society of Arts ?

6. What means can be adopted by the Local Boards to secure a larger number (*a*) of Candidates from the Artizan Class at the Final Examinations, and (*b*) of Female Candidates at the Elementary and Final Examinations ?

7. Whether it would be expedient to adopt, as far as possible, one specified text-book for each of the subjects in the Final Examinations ?

8. Whether it would be expedient that the Society of Arts should decline to recognize an Elementary Certificate of any given year as a Pass to the Final Examinations of the same year ?

9. Whether it is desirable, in the Elementary Examinations, to have one set of papers instead of two, as at present, but with two grades of Certificates, according to the merit of the Candidates ?

10. Whether, in order to secure uniformity in the Previous Examinations, the Society of Arts should furnish an Elementary Paper (distinct from the Ordinary Elementary Examinations) to meet the case of those Candidates who may not, in any previous year, have obtained Elementary Certificates ?

11. Whether any steps can be taken by the Society of Arts, in order to prevail upon the Science and Art Department to grant Honorary Teachers' Certificates to those gentlemen who shall be recommended by any Public Educational Board ?

12. How can the Institutions or District Unions assist the movement now being made by the Society of Arts to send selected Workmen to Examine and Report upon the Paris Exhibition ?

Secretaries of Institutions and Local Boards are requested to send, as soon as possible, the names of the Representatives appointed to attend the Conference, and early notice should be given of any other subjects which Institutions or Local Boards may desire their Representatives to introduce to the notice of the Conference.

As the subject of National Education is of peculiar interest at the present time, and several topics of great importance to the Institutions are proposed for discussion at the Conference, the Council hope that each Institution and Local Board will not fail to appoint one or more Representatives to express its views.

Secretaries of Institutions are requested to forward *at once* by book post, copies of the last Annual Reports of their Institutions.

Examinations, 1867.

The following corrections should be made in the List of Prizes and Certificates given in last week's *Journal* :—

In Political and Social Economy, the 1st prize of £5 to No. 1473, Edward T. Sims, jun., Southampton Athenæum, clerk. No second prize awarded.

To the note marked (†) add, "or the candidates were disqualified for receiving prizes."

In the List of Certificates, No. 1489, Hadfield, James, should have been described as of the Staleybridge M.I.

Artizans' Visits to Paris.

The Council of the Society of Arts, feeling the importance of promoting the intelligent study of the Paris Exhibition and the manufacturing establishments in France by artisans of the United Kingdom, have appointed a Committee in furtherance of this object, and on their recommendation, have passed the following minute:—

At the last and former International Exhibitions held in this country, arrangements were made by the French Government, to facilitate the visits of skilled artizans, and interesting reports on the exhibitions were made by them to their government. Believing that such visits on the part of skilled workmen to these great international displays not only exercise a beneficial influence upon the men themselves, but also upon the progress of industry in the country to which they belong, the Council of the Society of Arts have resolved to raise a fund to be employed, in aiding a limited number of English workmen to proceed to Paris for the purpose of studying the present French Exhibition.

To carry this object into effect, they have agreed on the following plan:—

1st. That a number of selected workmen (the number to depend on the amount of funds at the disposal of the Council) shall be assisted to proceed to and remain in Paris a sufficient time (say three weeks), for the purpose of making a careful study of the exhibition, and of such factories and workshops as they may desire to visit.

2nd. That every man so assisted shall, on his return, make a report to the Society of what he has observed during his stay, in reference to the special industry in which he is engaged, and that it be made a condition of the grant to each man that one-third of the amount be retained until his report shall be supplied to the Society.

3rd. The Council think it will be undesirable to fix the exact time for, or to prescribe the duration of, these visits, or to interfere with any of the arrangements the men may desire to make for their own accommodation; but, in order that they may take advantage of the facilities provided by the Commission organised by the French Government for the study of the exhibition, the men will be placed in communication with that Commission on their arrival in Paris.

4th. A considerable sum will be required satisfactorily to accomplish the important object undertaken by the Society, and, in order to raise these funds, the Council have determined to appeal to the members of the Society, who must be interested in the successful results of this movement, in the belief that they will not hesitate to join in a subscription for the furtherance of the undertaking; and they propose at the same time to communicate with the various Chambers of Commerce, inviting their counsel and support. The Council have decided to commence the subscription by a vote of one hundred guineas from the funds of the Society.

Members are invited to aid the Council in this undertaking by subscriptions, which should be forwarded to the Financial Officer at the Society's house.

His Royal Highness the Prince of Wales, President of the Society, has presented a donation of Thirty Guineas.

Subscriptions.

The Lady-day subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Twenty-third Ordinary Meeting.

Wednesday, June 5th, 1867; Thomas Webster, Esq., Q.C., F.R.S., in the Chair.

The following candidates were proposed for election as members of the Society:—

Asprey, Charles, jun., 166, New Bond-street, W.
Byass, Robert B., Nevill-park, Tunbridge Wells.
Cross, John C., 12, Barnsbury-road, Islington, N.
Edwards, Robert, 35, Lower-street, Deal.
McMillan, John, 7, Westminster-chambers, S.W.
Meeson, Alfred, 5, Westminster-chambers, S.W.
Mounsey, Ewart Simon, 5, Raymond-buildings, Gray's-inn, W.C.
Rossiter, William, F.R.G.S., Linden-villa, Tottenham, N.
Rutherford, Charles, 32, Oakley-road, Southgate-road, N.
Sykes, John, 280, Regent-street, W.

The following candidates were balloted for, and duly elected members of the Society:—

Armit, Lieut.-Col. Louis, R.E., Golden Cross Hotel, Charing-cross, S.W.
Davidson, James, Laboratory Department, Royal Arsenal, Woolwich, S.E.
Lucas, Frederick, 26, Maddox-street, Regent-street, W.
Salvin, Anthony, 4, Adam-street, Adelphi, W.C.
Whitley, Nicholas, Truro, Cornwall.
Williams, Michael, 35, St. James's-place, St. James's-street, S.W.

The Paper read was—

ON THE WATER SUPPLY OF THE METROPOLIS, IN RELATION TO THE CONSERVANCY OF THE THAMES AND ITS TRIBUTARIES, AND THE DEMANDS OF THE WATER COMPANIES.

By J. Bailey Denton, Esq.

It may be in the recollection of some of our members that I have on several occasions raised discussion within these walls on the subject of water supply in connection with land drainage, river improvements, and the necessity of an accurate record of rainfall.*

On these and on other occasions I have treated the subject as one of national importance, affecting not the metropolis only, but extending to the whole country, being impressed with the facts, which are daily becoming more generally acknowledged, that the rainfall is getting positively, though gradually, less in quantity, from the disafforesting of woodland, the improved cultivation of the soil, and the drainage of lands and districts; that, although, by the drainage of land, we gain an increase of water in the winter season, we suffer a diminution in summer; and that the sewerage of towns is corrupting our rivers and streams in their transit through the country to the sea, proportionately as the sewerage of towns extends and the summer flow of rivers become less. All these influences are connectedly producing a great change in our water system, demanding the serious attention of the people and the protective care of the Government; and we cannot shut our eyes to the truth that our population is increasing at the rate of 200,000 a year, or 3,845 a week, while the area of our island remains the same.

I have not hitherto laid any great stress upon the diminution of the rainfall, because it has always been considered that the position of Great Britain, in its proximity to the wide Atlantic Ocean—from the surface of which evaporation takes place to an unlimited extent, increased by the warm current of the Gulf stream—is such as to make any diminution of rainfall resulting from re-

* *Journal of the Society of Arts*, December 14th, 1855; January 15th, 1858; and November 24th, 1865.

duced evaporation from the surface of our island a matter of very little moment. The valuable essay of Professor Ansted, recently published in the *Journal of the Royal Agricultural Society of England*,* however, places the matter in so clear a light, and raises its importance in the eyes of scientific men so considerably, that the subject cannot long remain one of indifference to the people at large. He shows, by very simple diagrams, formed from the records kept at Greenwich —which are reliable, I presume, and have been kept for a period extending over 50 years—that a "considerable decrease" in the amount of rain has taken place within that period. The Professor, when comparing the rainfall within the period from 1814 to 1864 inclusive, states that during the first 25 years the mean annual fall was 26·69 inches, or 1·44 inch above the general mean of the 50 years, and that during the last 25 years the mean fall was 23·75 inches, or three inches less than the first 25 years. He also shows that, during succeeding periods of seven and fourteen years, from 1815 to 1863 inclusive, the decline in quantity has been as follows:—

Years.		Inches.	Mean of 14 years. Inches.
1815–1821..	Mean rainfall	28·7	.. 28·3
1822–1828..	,,	27·9	.. 26·1
1829–1835..	,,	24·3	.. 24·7
1836–1842..	,,	25·1	.. 24·6
1843–1849..	,,	24·1	.. 24·0
1850–1856..	,,	23·8	.. 23·8
1857–1863..	,,	23·7	

If we deduce from this instance that the rainfall is generally declining, we cannot reject from consideration the counterbalancing circumstance that land drainage, which is taking place all over the country, discharges into the rivers from the land a *larger* quantity of water than found its way to them before drainage, and more than is actually lost to the rivers by the lessened rainfall. In fact, if the whole area of the Thames watershed consisted of wet land, which would be benefited by drainage, we should, in the aggregate, be considerable gainers by the extension of the practice; but the wet lands form only the smaller portion of its area, and therefore we can only apply the advantage to that lesser extent. Moreover, it is hardly necessary to repeat, the water of drainage issuing from our clay lands is not constant; it is for the most part discharged in the winter months, when both soil and air are frequently in a state of saturation and when vegetation is dormant, and ceases to flow in summer when evaporation is active and the demands of vegetation can hardly be satisfied. Hence it is that the underground operation of drainage, which we adopt for the amelioration of our heavy wet lands, adds to the derangement already caused by the improved cultivation of the surface and the spread of population. It extracts from the soil, in fact, the water which has hitherto been retained to moisten the air of summer and to support our rivers. Thus the floods of winter and the droughts of summer are both increased, and the hygrometric condition of the atmosphere altered so much as to make us acknowledge that England is undergoing an appreciable change of climate.

Before passing from this point, it is right to state that if drainage consisted only of subsoil drainage the tendency would be to render floods less frequent, because the water, having to pass through the soil intermediate between the surface and the drains, would be seized and detained in that depth of earth on its way to the outfall, and if the rains were not repeated too quickly the sudden congregation of waters would be prevented. But as the primary object of drainage is to get rid of excessive wetness as soon as possible, the outlets and watercourses are now so much improved, and are every day becoming more and more improved, by straightening and widening, that the expected detention is more than counteracted by the facility afforded for the immediate discharge of both surface and drainage waters, which are precipitated into the valleys with a suddenness unknown fifty years back. The importance of this consideration can hardly be excluded from the immediate subject before us—the supply of water to the metropolis—for when this excess of water from drained lands, discharged as it is in winter, is added to the increased flow of springs and watercourses natural to that season of the year, it must be obvious that the surplus so placed at our disposal at one season to compensate for scarcity at another is a gift we ought not to reject. It is no part of the present purpose to specify with accuracy the quantity of water so placed at our command, though it is much to be regretted that the special terms of the Water Supply Commission prevented the Duke of Richmond and his colleagues from carefully inquiring into the capabilities of storage existing, and the means of making reservoirs, within the Thames basin. It is, nevertheless, of the first importance that these points should be understood by the country, for in the inexhaustible powers of storage exists the solution of the whole question of supplying London with economy. No one who has critically investigated it doubts the abundance of water existing in the basin of the Thames, though the prevalent opinion with the general public is the reverse.

While asserting that if storage be resorted to the excess of the driest winter will more than compensate for the drought of the driest summer by which it may be succeeded,* I am content to place before you the following facts in support of the assertion:—

Out of the average mean rainfall of 26 inches due to the Thames basin, it requires only $\frac{3}{4}$ of an inch of the surplus of winter from the whole watershed of the Thames, or $1\frac{1}{2}$ inches of rainfall from one moiety of the watershed, to satisfy the whole population within it. Or, to put the matter more practically, as it will only be necessary to collect water for six months of the year, half an inch of rain falling upon an acre of land is sufficient to supply two persons with 30 gallons each per diem for six months, and no winter passes by in which there does not run off to the sea, without serving any useful purpose, in excess of the mean summer flow of the river, at least five times the quantity required to meet the supply of the metropolis in the dry times of summer, when the river cannot fairly part with any portion of its volume; and this, or any portion of it, may be stored for compensation to the river if reservoirs were properly constructed for the purpose. To appreciate our present position it should be understood that the water companies are continuing the unexampled practice of abstracting from the Thames 60,000,000 of gallons daily, which may be increased to 100,000,000, independent of what is now desired to be taken by the East London Water Company, without any compensation whatever, although it is acknowledged that the volume of the river (which should always be maintained, if possible, at a standard flow,—say of 450 millions of gallons per diem) is sometimes reduced, in dry summers, after the companies have abstracted their supplies, to from 300 to 350 millions of gallons.

Now I pause to ask why this one-sided practice

* *Journal of the Royal Agricultural Society of England*, Nos. III. and V., second series.

* When speaking of the rainfall in years of scarcity we have been led into confusion by the published returns being tabulated according to the calendar year, whereas the summer flow of rivers depends on the preceding winter's rainfall. No month's rain has so much influence on the supply of summer as the fall of the previous October. If we have a wet October and an average wet winter the springs will be replenished, and the flow of our rivers increased.

should be continued. Is it right, with a declining rainfall and a declining summer flow, we should allow one-fifth, which may be increased to one-third, to be abstracted in summer without compensation, when, by simply storing the surplus of winter, we may secure the means of returning to the river any quantity equal to that abstracted from it, when the river volume falls below a certain recognised standard height? Unfortunately, the Legislature, in its wisdom, by granting, in the first place, to the five water companies drawing their supplies from the Thames, the power of abstracting 100 millions of gallons daily, and in the next by being a party to the payment of £6,400 a-year by those companies to the conservators * for considerations it is difficult to understand, has sanctioned and condoned this unexampled proceeding; and although the public interests have been prejudiced thereby, it is now too late to cancel these powers altogether. But it does not follow that a rule should not be made which shall be binding on the companies in future, obliging them to provide compensation for whatever water is taken from both the Thames and the Lea, when their volumes have fallen below a given standard at the points of abstraction, be the reduction what it may.

If this proposal were adopted we should hear no more of a scarcity of water, and the superior character of the river Thames and its tributaries would be restored.

I began by stating that among the influences conspiring to disturb the water economy of the country the sewerage of towns by the pollution of our streams was having a considerable weight, and as the prevention of this evil will test to the utmost the powers of conservancy, it may be well to make some general remarks, which may have their bearing upon the Thames and the Lee too.

The water-closet system has now acquired such a firm place in our household arrangements, that we cannot anticipate the use of any other vehicle but water for the discharge of sewage from towns of any size, however we may modify the system in villages, and for suburban and country houses, by the adaptation of earth closets, which are most excellent expedients, and will no doubt come into extensive use where combination in sewerage is not necessary to effect the duties of the scavenger. It is the daily increasing use of water-closets in towns, and the immense growth of special trades and manufactures using and abusing our streams, that sets aside all previous provision.

It is admitted that rivers, to answer their full natural purpose, must serve as drains to receive the liquid refuse of their watersheds, as well as sources of water supply for the towns within them; and, perhaps, the most difficult problem to solve in the present day is, the obligation to maintain, at one and the same time, these two objects—reconciling, as it were, the antipodes of riparian service. The conclusion, I believe, to which the intellegence of the country has arrived is, that, abstractedly no water can be used with impunity for drinking purposes after sewage has been mixed with it. Or, to give the matter a practical bearing, it may be more truly said that, as soon as sewage can be detected by chemical analysis to exist in an appreciable degree in the water we are called upon to drink it is a vital error so to use it. Of course, as rivers can but maintain their natural position as the drains of their watersheds, it is not possible altogether to exclude objectionable liquid refuse; and as some of the best chemical authorities declare that the water of rivers, and the Thames among the number, if mixed with only a small proportion of clarified sewage, remains substantially innocuous, if advantaged by the oxidizing influence of a run of several miles before use, it is only necessary to determine with precision what proportion of organic matter, animal and vegetable, shall be allowed to exist in drinking-waters when delivered to the consumer. If we arrive at this we practically fix the chemical standard of quality, and it then remains to determine by what means it shall be maintained. Even in their aboriginal state all rivers received organic matter in the shape of decayed vegetation, and if we ascend to the higher portions of rivers for our water-supply we cannot exclude a certain amount of both animal and vegetable refuse, although the towns are comparatively small and few which are situated at the heads of rivers, and there are generally geological conditions of soil which favour the absorption of liquid matter. It is not for me to suggest what should be the standard of quality, but seeing that different companies taking water from the same spot,* deliver to their consumers water with very different proportions of organic matter, it is manifest that some rule should be fixed and accepted, and from which the water companies should not depart.

Professor Frankland stated, in his evidence before the Thames Navigation Committee of last year, that the quantity of organic matter in the Thames varied from three quarters of a grain minimum to two grains per gallon maximum, and with such data it would not be difficult to fix a standard of purity.

Of all methods of purification the application of sewage to land is the only one to which science accredits the power of arresting objectionable matter, though the mode of application is found to govern the extent to which the process succeeds. Sewage discharged from towns by gravitation, or lifted by mechanical power to high grounds, if it passes simply over the surface of land without passing through it, retains a large part of the noxious matter, and cannot be considered to be in a fit condition to mix with river water used for drinking. This view applies with increased force the nearer the irrigated lands approach the river. The absorbent powers of vegetation are doubtless very great, but they are not sufficient in themselves to appropriate the impurities held by water in suspension as well as in solution. Moreover, vegetation has not equal vital powers all the year round to seize and appropriate the fertilizing elements which are its food. It has its seasons of rest as well as of growth, and at such times its extractive and retentive capabilities are very small. When vegetation, however, grows on a deep bed of free soil, through which the sewage can descend and percolate, after satisfying the vegetation, we possess the best means of purification, its perfection depending quite as much on a sufficient depth of subsoil through which the effluent water must descend as upon the action of vegetation.

We must not confuse the system of irrigation which allows of the effluent water to sink into the subsoil *after satisfying vegetation* with the "dumb-well" or cess-pit mode of disposing of sewage in its normal state. In the first case, the effluent water which would pass into the river as clarified sewage, if "run over land" sinks into the soil and replenishes the springs, after being utilised on the surface; whereas, in the second case, the sewage is dropt into holes of porous ground, which retain the solid matter to fester under foot, and allow the liquid sewage to sink into the earth without doing any good whatever to vegetation.

Where free soils affording natural drainage are not to be obtained, the nearest approach to them is land to which underdrainage has been or may be applied, the drains in such case affording artificially a means of discharge, when the level of the drains is reached, similar in character to that which takes place in a deep

* The following are the payments made by the water companies taking their supplies from the Thames to the conservators:—

	By agreement, 1852.		By Act, 1866.		
Chelsea	300	+	1,000	=	1,300
Grand Junction	300	+	1,000	=	1,300
Lambeth	200	+	1,000	=	1,200
Southwark and Vauxhall	300	+	1,000	=	1,300
West Middlesex	300	+	1,000	=	1,300
	1,400				6,400

* See Appendix XIV. to the First Report of the Rivers Commission.

bed of free soil when the descending water reaches the level of the springs. But as the depth of under drainage is limited to a few feet, the extent of purification is limited correspondingly, and though to the eye, and probably to the taste in many instances, the discharged water from lands irrigated with sewage may be unobjectionable, I believe I am correctly stating the fact in saying that such water is seldom if ever free from organic matter. The question which therefore arises, when applying sewage to drained land, is whether the filtration it undergoes, in addition to absorption by vegetation, is sufficient to allow of the effluent liquid from the drains being mixed with impunity with river water used for drinking. Abstractedly, it is wrong to do so; but, as under many circumstances theory cannot always be carried to its extreme, it will probably often occur that the distance to be travelled by the mixed waters before use will be sufficiently great to effect oxidization and so remove all objection. Expediency may thus over-ride principle and sanction the proceeding.

As a rule, it may be assumed that the application of sewage will be profitable in proportion to the command the farmer may have over the sewage he applies. It may percolate the soil and pass away too quickly, and a sufficient breadth of land may not be covered at a dressing. The irrigated land may, in fact, be far too open and free for the farmer's profit, though not for purification. To irrigate undrained clay lands is opposed both to profit and purification, for it cannot be expected that land already suffering from excess of the rainfall will benefit by double the quantity of sewage-liquid being run over it and added to the rainfall. The same lands drained will bear any amount of irrigation with an increase of produce of good quality, though the effluent water may remain polluted; but to apply sewage to land possessing no escape through the soil is to "put the compost on to make the weeds grow ranker," for the herbage can only be coarse and very inferior in character. When we have had more experience in sewage farming—and it will doubtless become a special business, as the Rivers Commissioners have pointed out in their reports—it will probably be found that a system of drainage admitting of the plugging of the outlets, so as to hold back the water in the soil for a time, and to flush the drains, will be adopted. In some parts of England this plan is adopted for water irrigation with success.

Thus we are compelled to view the application of sewage to land in three ways:—

First. That sewage run over a surface of land which has neither natural nor artificial drainage to assist vegetation in retaining the deleterious elements, altogether fails to secure that degree of purity which will allow of its being discharged into rivers, from whence may be taken water for drinking purposes, though the operation may serve to clarify and improve its character sufficiently to allow of its being utilised in rivers for navigation, and for many other riparian uses.

Second. That land artificially drained to a depth of a few feet affords, if irrigated, only an imperfect means, in conjunction with vegetation, of separating from sewage its objectionable elements.

Third. That where sewage can be lifted to high and fertile grounds with a free and porous subsoil, which will admit of its penetration to a considerable depth after it has fed vegetation on the surface, a perfect means of purification may be attained.

With these conclusions as to the utilisation of sewage and the steps to be taken to exclude it from rivers when in an objectionable condition, we have to consider how far they will be acted upon or enforced by the Board of Conservators, under whose care the Thames and its tributaries are now placed; and in my remaining observations I shall content myself by bringing before you the position and duties of the Conservators of the Thames in relation to water supply, and the powers they possess of securing to the five water companies, with whom Parliament has associated them, water of unobjectionable quality.

In speaking of quality, I am aware that I shall bring to the minds of many the question of *hardness*, which is one of great importance. It forms no feature of my paper on the present occasion, because, as its title implies, it is confined to the Thames and its tributaries, and it is not possible to obtain from these sources any other character of water than that partaking of from 13 to 18 degrees of hardness. If we were comparing the water of the Thames with other and distant sources of supply, offering different qualities of water or different degrees of hardness, the object would be directly pertinent, but I desire to exclude all points which might provoke a discussion on the relative merits of the different schemes now proposed for the supply of water to London, and which would have the effect of diverting attention from the Thames. My own name, indeed, has been associated with a proposal for utilising the upper tributaries of the Thames in conjunction with the storage of surplus waters, in which I still retain the utmost confidence, but I do not appear here to night as an advocate of that project, feeling that I should be abusing my connection with the Council of this Society were I to do so. It cannot be denied that to exclude the question of hardness from any discussion on the supply of water to a great community like that of the metropolis is to omit a very important element, but when you are reminded that its introduction would open up a wide field of argument as to the national policy of abstracting water from one valley to supply it to another, the power of reducing hardness by chemical appliances, and the relative healthiness of hard and soft water—the consideration of which alone would be sufficient to occupy the evening—you will probably concur with me in a desire to confine our attention to the present powers afforded by Parliament for securing to the metropolis a supply of wholesome water from the Thames through the agency of the water companies, with the support of conservancy.

The urgency of the question of metropolitan supply is demonstrated by the fact that while we justly hesitate to take water from the high grounds surrounding the manufacturing districts of the north-west, because the increase of population in those districts is truly prodigious, and in excess of the increase of the metropolis itself, the addition each year to the population of the metropolis is 40,000, which, I need not tell you, alone exceeds the number of people in the majority of county towns in England.

To describe in detail the constitution and duties of the Board of Conservancy of the River Thames would take too much of our time, but it may be useful to state that the Corporation of the City of London, who were the original conservators, transferred their powers and duties to the Board constituted by the Act of 1857, and with them the obligations of an agreement entered into in 1852 with the five water companies drawing their supplies from the Thames, by which £1,400 a year was arranged to be paid by these companies to the conservators "as compensation for expenses incurred by the conservancy in consequence of the works of the companies." In 1864 the constitution of the Board was reorganised, though its duties and jurisdiction were still confined to the improvement and control of the river below Staines. Those duties professedly were the maintenance of the navigation, with jurisdiction over the shores and the uses of the river, and the actual works of the Board extended only to the preservation of the banks, locks, weirs, and other river works essential to navigation, and to the dredging and scavenging of the river itself. Last year the jurisdiction of the Conservancy Board was extended from Staines as far as Cricklade, and the Legislature, considering it expedient that a provision should be made for preventing the pollution of the river, and that the five water companies drawing water from it would be benefited thereby, authorised and imposed the payment of £1,000 a year

from each company to the Conservancy Board, having rendered it obligatory on the part of that Board to scavenge the surface of the river, in order to the removal therefrom of all substances liable to putrefaction, and to clear the river of weeds, that they might not decay. It would appear, however, that there was some doubt in the minds of the committee which settled the Act whether the presiding authority of the river might not itself be sometimes at fault, for by the fifty-first clause of the Act provision is made for an appeal to the Board of Trade, "should any work executed by the Conservators, in the opinion of the five metropolitan companies, injuriously affect either the flow or purity of the water of the Thames." No works to be executed by the conservators seem to be contemplated by the Act of last year, nor indeed by the Bill of this session, either for the increase or purification of the water of the Thames other than those essential to a proper maintenance of the river for navigation. The actual operations of the Board would appear to be limited to improving and maintaining the navigation and the supply to mills, and in scavenging the river, while its powers are extended to preventing towns and persons from polluting its waters by the discharge of sewage and obnoxious matter. The Act of last year declares that it shall not be lawful for any sewage to discharge into the river, or into any stream connected with it, within three miles of the main trunk (which provision it is presumed will shortly be extended to all the tributaries), and it requires the Conservators to give notice to any person or body to discontinue the discharge of sewage after a certain time named in the notice, which shall not be less than twelve months nor more than three years, imposing a fixed penalty, payable, by any one disregarding the notice, of £100, with a further penalty of £50 a day if the nuisance be continued. With the service of the notice and the legal proceedings against any one disregarding them, the direct action of the Conservators—as respects the purification of the river—ends. They appear to be a valuable medium for enforcing the law.

Though they have the authority to prevent the continued abuse of the river by pollution, they cannot prevent a legitimate use of its waters as population and trades increase, and agriculture may require it; and though they would successfully resist the water companies taking out of the river more than they have parliamentary powers to take, the Conservators have no power to enforce compensation from storage, let the effect be what it may. With powers of so little practical advantage as respects water supply, it is difficult to understand for what purpose the water companies are paying the additional £5,000 a-year, which, by the Act of 1866, they are collectively bound to pay. The first contribution of £1,400 a-year may be taken as payments incident to, though not directly for, the abstractions at Hampton, which in some degree affected the navigation below; but with respect to the last payment of £5,000 a-year, there exists no similar reason, inasmuch as the companies have no additional powers given to them, either to take more water, or to abstract it higher up, where it would affect the navigation above Staines. The payment could be understood if, by any actual expenditure on the part of the Conservancy Board, the additional quantities of water the several companies have yet the power to take were positively secured to them, without raising any objection on the part of the public interested in the river. If, on the contrary, the £5,000 a-year is, as I have supposed, required to maintain the river banks and works for the upper navigation, it would only appear right that those interested in, and to benefit by, that navigation should find the money, particularly as the Act recites that "if the duties of the conservancy of the upper part of the Thames were efficiently performed, the traffic on the navigation, and the income derivable therefrom, would considerably increase." With this expectation, there could have been no difficulty in raising any required amount of money by a loan, repayable by instalments, extending over a sufficient length of time to realise the assumption. As it is, however, the interests of the public have been sacrificed, and, as I have before stated, a prejudicial compromise effected. The water companies doubtless consider that they are paying their £1,000 each for the privilege of drawing their water from the Thames as it passes by Hampton in whatever condition it may be secured to them by the proceedings of the conservators of the river, and that they are exonerated by the payments they make from compensating the river for any quantity they may in future take out of it, within the limits of 20 millions of gallons each, even though the flow of the Thames may from other causes be materially reduced. No doubt the companies are justified in so regarding the arrangement, but it remains with the public to say whether some modification must not take place.

The quantity of water yet to be taken from the Thames under existing Acts is 40 millions of gallons daily, and this is likely to be increased by the 10 millions required by the East London Water Company. This company, with the New River Company, have absorbed the entire dry weather volume of the Lea, after the navigation has taken its prescribed quantity, and the company is obliged to come to the Thames for its immediate wants, no effort having been made in the valley of the Lea to store its surplus waters.

So great is the increase of demand for water in the metropolis, that it may be but a very few years before the maximum quantity which the companies are empowered to take may be reached. In the meantime winters may succeed, like the last, in which the valleys of the Thames and its tributaries may be in a state of inundation, involving local losses of an immense aggregate amount; and it may be fairly asked whether a compact such as the Legislature has sanctioned shall continue to have effect without an effort being made so to balance excesses that the evil of one season may be turned to the benefit of the other.

It is only in this way that we may satisfy the question of quantity, and, having placed before you in earnest terms, the difficulties resulting from the Parliamentary compact I have referred to, I leave it in your hands for consideration.

I will now recall your attention to the question of quality. It may be found that the towns called upon by the conservators to discontinue the discharge of their sewage into the river may evade purification by the adoption of imperfect works. Some may have recourse to irrigation on river-side meadows without drainage, whereby, as I have already stated, the effluent water may flow into the river clear to the eye, though almost as foul as before. Others will adopt different expedients, but all will abstain as long as they can from incurring the extra expense of lifting the sewage on to high grounds, or even of under-draining the irrigated lands (which, as I have said, should always be insisted upon where natural drainage does not exist), to secure the necessary absorption which is essential to that degree of purification required by water-drinkers.*

In the meantime, the contributions of the water companies will be paid to the Board of Conservancy, and

* We may see on the Lea a very telling instance of the way in which money may be spent in proceedings carried out in obedience to an Act of Parliament, without producing the intended effect. It is described in the words of the Rivers Commissioners: "By an Act passed in 1854, the New River Company obtained powers to lay down intercepting sewers through Hertford, to construct works for treating the sewage by the liming process, and to convey the effluent water past the New River head into the Lea." These works cost £2,200, and £700 is paid annually to carry out the process. "The effluent water passes away clear," and being mixed with the water of the Lea, is drank by the water consumers of the metropolis, though the people of Ware, the town immediately below Hertford, find this "clear sewage" "a constant cause of complaint." It is declared by the Rivers' Commission to be sewage still, with the disadvantage of appearing to be different to what it really is.

this implies an obligation strengthened by each succeeding payment.

It has never, I believe, been publicly suggested, though the proposal is worth consideration, that, as the authorities of the towns now discharging their sewage into the Thames may fairly content themselves with, and satisfy their ratepayers by adopting, the cheapest disposal of the sewage which shall legally meet the terms of the notice which may be served upon them, it may be only right that those who are requiring such a purification of the water as shall make it fit to drink should pay something towards the difference between the cost of carrying out irrigating operations which shall legally satisfy the conservators' notice and those which will satisfy the water-drinkers of the metropolis.

Compared with the application of sewage to lower grounds by gravitation, the lifting of sewage on to high grounds not only involves a greater first cost, in modifying and extending the outfall works and in erecting steam engines, pumping-stations, and appliances, but there remains as a constant outlay the cost of fuel, wages of engineer, &c., which form no items when irrigating by gravitation. Does it not appear reasonable that some proportion of this outlay should be paid by those who require a degree of purity beyond simply clarifying the sewage so that it shall satisfy navigation and other riparian uses.

To put the matter in a tangible form, and having in view the towns of Banbury, Oxford, Reading, Abingdon, Wallingford, Windsor, and the many other towns on the Thames and tributaries above Hampton, I may state that the annual cost of raising the sewage of 250,000 persons to a height of 100 feet, and to a distance of five miles, may be fairly taken at £5,000 a year.

Now, as the £5,000 a year, payable to the conservators under the Thames Navigation Act, 1866, consists of the money of the water drinkers, though it passes through the hands of the water companies, is it not fair that the whole or a part of the annual outlay required for lifting the sewage of such towns as are situated above the point of abstracting the supply to the metropolis, should be paid out of this fund? This amount (£5,000), if so applied, would go a very great way towards satisfying the question of quality—assuming that the towns referred to would meet the question by taking upon themselves the extra first cost of the necessary works.

This suggestion appears equitable and right in many respects, and I leave it for your consideration, merely adding that by apportioning the £5,000 a year among the towns according to population, the conservators would be relieved of the anomalous position of receiving money from the water drinkers of the metropolis, without making any positive effort to raise the quality of the water to a standard of purity.

In bringing these remarks to a close, it will not be necessary for me to assure you that I am conscious of their imperfect nature. With a subject so large, I have experienced more difficulty in bringing what I have had to say into a small compass, than in finding matter to support the few objects I have desired to make prominent. I have nevertheless managed to curtail my observations to limits which have left good time for discussion —which is the more desirable as this meeting is the last of the session.

DISCUSSION.

Mr. S. C. Homersham said, if he understood the paper aright—and he had taken some pains to do so—the question raised in it was, whether a large body of flood water should be impounded in the upper tributaries of the Thames, or in the Thames itself, and let out in dry seasons for the purpose of giving a more equable flow to the river. The writer of the paper had not said very expressly that this was his view, and he had not given, for instance, the quantity of water which ran down the river in flood times, and the quantity that flowed down in dry seasons, nor the area of the water shed of the Thames, nor, in fact, any exact data to go upon by which it could be ascertained whether such a proposition could be dealt with or not. All data of this kind—whether studiously avoided or not he could not say—certainly were kept out of the paper, and there was no proposition before the meeting except a general one that flood waters should be impounded in ordinary reservoirs and given out in seasons of drought. If they were to discuss that question intelligibly they must have data and figures of an exact and positive character, whereas the only figures of any kind given were (and he believed that they were correct), that there was an average rainfall of twenty-six inches in the watershed of the Thames, this being assumed from the ascertained average of the rain-fall being twenty-four inches at Greenwich. The area of the watershed of the Thames down to the point where the water companies took their supply was 3,500 square miles or thereabouts; and the area of the watershed below Hampton to the mouth of the river was about 1,500 square miles, making altogether 5,000 square miles as the watershed of the whole river. But before discussing the proposition which was made, it was necessary to know what was the character of that watershed. There were some large districts of country upon which, from the physical configuration, and from the character of the soil and the rock of which they were composed, water no sooner fell than it ran off; and within a few hours after a heavy rain all the water, or nearly all, flowed off through the brooks and streams, and came down in a heavy flood. He knew districts where very large impounding reservoirs might be dry at 9 o'clock in the morning, and if there were heavy rain would be quite full and running water to waste at three o'clock the same afternoon. That was the character of many soils, but there were others where there might be heavy rain, even to the extent of 1½ inches or more in the hour, but where no water at all would appear in the streams, the whole being absorbed by the drainage-ground instantly, and sinking beneath the surface, and where one might go over the ground when the rain was over and almost say that it would not be wet, and there would be no flood or water at all even in the valleys and on the lowest ground. He knew a district in one patch, of 272 square miles, where neither river, spring, nor stream was to be seen on the surface at all, the whole of the water which fell upon it being immediately absorbed into the soil and rock of which the district was composed. Now, the having to deal with a soil of that character, or with one where the water ran off immediately, were two very different things, and therefore they must examine not only the area but the character of the drainage-ground of the Thames. Of the 3,500 square miles which he had given as the area of the drainage-ground down to Hampton, about 1,200, or a third-part, consisted of chalk, a character of soil so porous that no sooner did rain touch it than it was absorbed; there was also another portion of the drainage-ground where the subsoil was green sand, which was also another absorbent rock. Below Hampton Court he found 600 square miles of the drainage ground to be chalk, so that in round numbers it was correct to say that one-third of the total drainage ground consisted of a soil that absorbed water as soon as it touched it. Dealing first with the portion above Hampton, the first place where the chalk appeared in the river course was at Maidenhead, and then the river ran on for about 30 miles, following the sinuosities of the river, on chalk, after which the chalk disappeared. The level of the water standing in the saturated chalk at Maidenhead was 60 or 70 feet above Trinity high-water mark, and the level of the chalk saturated with water in the Chiltern range, beginning near and above Luton and Tring, was 450 feet above Trinity high-water mark. The variation in the line of the saturated water level in the highest point was something like 40 to 50 feet in the year, being highest, generally, about the end of June, and lowest at the end of December. There was a saying in

those districts "as the days lengthen the springs strengthen," which was really true, as up to about the longest day the water gradually rose, and from that day to the shortest day, as a general rule, it fell, the variation on an average, and taking one season with another, being about 40 or 50 feet. Now, a cubic foot of dry chalk would absorb 2½ gallons of water on an average; all chalk was not exactly of a like quality, but about one-third of the bulk of chalk consisted of small pores, and, as a cubic foot would be equal to 6¼ gallons, it would take up on an average considerably more than two gallons of water, so that fully a third of the cubic contents of saturated chalk was water. This was very important in considering the question before them, because, seeing that there were 1,200 square miles above Hampton, where the whole rainwater falling upon the ground was absorbed, and that there stood at the Chiltern ridge chalk saturated with water to the level of 450 feet above high-water mark, and to 70 feet at Maidenhead, it followed there was an average depth of 260 feet of chalk above high-water mark saturated with water, which was equal to a column of water itself 86 feet in height, so that literally there were 1,200 square miles of chalk in the drainage ground of the Thames, above Hampton only, with free water in it to the depth of 86 feet. This was a matter of fact—there was no question of theory about it. The tops of the hills of the Chiltern ridge varied from a thousand to six or seven hundred feet high, and taking the average at five or six hundred feet the dry ground would average 200 feet down to the saturated chalk, and below that there were 360 feet of saturated chalk, equal to 86 feet of free water. A very simple calculation would show that this was equal to about 18 trillions of gallons of water, or to a supply of 200 millions of gallons of water per day for 246 years. This could be clearly demonstrated. No doubt few persons present were sufficiently acquainted with the facts to know that when standing on those chalk hills, so dry on the surface and covered with very scanty herbage, they were really standing above quite a sea of water. That was the state of the case with regard to the large portion of the drainage ground of the Thames before described. There was water already stored in the chalk equal to a supply of 200 million gallons per day for 246 years, even if it were never replenished. Now, taking the rainfall at 26 inches, it would be but a small amount and an under-statement to say that 10 inches went to the lower depths. From an experience of 25 years in sinking wells and so on in the chalk, he (Mr. Homersham) believed it was much nearer 20 inches, but he was content to take it at 10 inches, which would give these 1,200 square miles as being replenished with a quantity equal to 408 millions of gallons of water per day for every day in the year. Now, with such an enormous natural storage reservoir so amply filled and so amply supplied, and so constantly replenished with water from the clouds, why should they try to impound in artificial reservoirs the flood waters for dry seasons? In his opinion it would be a very unwise proceeding, because every one who had had anything practically to do with water impounded in large reservoirs should know that it was not of a wholesome quality for the supply of large towns. For instance, the water in Loch Katrine was, no doubt, very free from mineral matter, but it contained a considerable quantity of organic matter, and decomposing organic matter, especially in warm autumn seasons, that was unwholesome, while before it got to Glasgow from Loch Katrine a portion of the oxygen combined with a portion of the organic matter, and the water became partially de-oxydized. However, leaving that subject, he (Mr. Homersham) considered that to store water in open reservoirs and then lower it down the Thames, would be very unwise, because water standing in these artificial reservoirs became of necessity mixed with fallen leaves, faded blossoms, the droppings of animals, and other impurities, and became of worse quality even than the flowing water so contaminated. These artificial impounding reservoirs were usually made in the most barbarous manner. They often had a depth of several feet of mud and filth at the bottom, and there were no means provided for cleaning the reservoirs out, and the water became full of confervæ and living organisms, in fact such as no water company ought to supply for domestic use. The proper way of supplying the water to the companies from the Thames would be to get at this water naturally stored in the pores of the chalk and to use it for the supply of London, which would prevent any interference with the navigation. This was being done in spite of every obstacle so unnaturally put in the way for many years past by government. They had all read in the papers of the poisonous character of the water that had been given by the companies at different times to London, and the number of the persons who died really poisoned by the water; that was due, he had no hesitation in saying, to the improper interference of the Government, or those acting under their authority, who made up blue books, and had prevented new companies from supplying pure water to London. Passing on to the lower part of the Thames below Hampton, there were 600 square miles of chalk to be found forming a portion of it, and one water company (the Kent Company) had already abandoned the river and gone to that source for supply, and now supplied water from that source to 32,000 houses, or a quarter-million persons, and for some time had not taken a drop of water from the river, but had gone to the chalk and obtained the water direct from wells. The New River Company also were gradually resorting to springs, or to wells sunk in the chalk. Such water at its source was of the best possible description for the purposes of a water company, being perfectly free from all organic matter, living or dead, and of one even temperature summer and winter. In the summer it was comparatively cool, 52° Fahr., while Thames and other surface water was 68° or 70°, and in winter it was about the same, when Thames water would be 33° or 34°, so that it was not liable to freeze in the pipes. The only thing which could be said against the water was that it was hard; but by a simple process, which had been in successful operation for many years, it could be reduced from 2½ degrees to 3½ degrees of hardness. Therefore, in the interests of the health of water-consumers, he hoped there would be no attempt to impound water in reservoirs on the Thames, but that the river waters should be altogether abandoned, and resort should be had at once to the natural reservoirs in the chalk for the supply.

The Rev. J. Clutterbuck thought it was quite useless to make any calculations in reference to water supply founded on the average rainfalls, as the minimum only ought to be taken; and he also objected to the average which had been taken by Mr. Bailey Denton, as deduced from the observations at Greenwich. He most emphatically denied that the rainfall had decreased during the last fifty years; observations of his own for sixteen years, and of others on whom he could rely for twenty-nine years, showed rather an increase than the reverse. This seemed a principal point in the paper, and he therefore wished to remove what seemed a false assumption, which might unnecessarily frighten people. Nor did he think that anything which could be done in the way of cultivation of land, draining, or cutting down timber, would in the least appreciable degree affect the rainfall, which was due to the Atlantic and Northern oceans. The storage of water in the Upper Thames might be very easily accomplished, as there was great power of storage in the river itself. He concurred with a good deal which had been said by Mr. Homersham with reference to the springs in the chalk, and believed it might be proved that the greater portion of the water which passed over Teddington lock at some seasons was derived from that source. If any one could see the miserable ruined inheritance on which the Thames Con-

servancy had entered, they would know that a great deal more money must be spent before the river could be restored to its proper condition, and one very great point gained would be the saving of the water by improvement in the navigation. With a little patience he believed they would see that they need not go elsewhere for water, but that Old Father Thames would be true to his great mission, and give them a good and abundant supply.

Mr. R. Rawlinson, C.B., said he had listened with considerable pleasure and interest to the remarks of the preceding speaker. The amount of rainfall was dependent upon causes of so vast a character, that he was perfectly satisfied that anything man could do would only modify it to an infinitesimal extent. Cultivation, clearing of land, and draining, would have but a very fractional influence on the fall of rain. Averages for even fifty years were not to be relied upon, but whether the rainfall had decreased or not they might take it for granted that nothing they could do would influence it either for good or evil. They could, however, economise that which fell on the surface; and he might mention one fact to Mr. Homersham which he might add to the facts which he had stored up with regard to the great gathering grounds of chalk, which he supposed to be of such vast absorbent powers. It had been his (Mr. Rawlinson's) duty to obtain accurate observations, extending over a considerable period of time; they had been obtained by men on whom he could thoroughly rely, and the results were very surprising. Mr. Muir, of the New River Company, Mr. Greaves, of the East London Company, Mr. Beardmore, a gentlemen of world-wide reputation in such matters, and Mr. Jas. Simpson, were his informants. The Thames had been guaged accurately for a series of years over Teddington Weir by Mr. Simpson, and the daily volume of water which flowed down ascertained, with the exception of excessive floods, and those were known approximately. The other gentlemen had carried out a series of observations on the River Lea with reference to the water supply and also for settling the legal rights of the several proprietors. The result was that, out of an average of 25 inches of rain, taking that as the datum, four-fifths of the entire volume could not be accounted for by measurement in any way, and they could only come to the conclusion that 20 inches out of the 25 passed again into the atmosphere. That result was so startling that he himself was sceptical at first until he had thoroughly investigated it. Now, as far as his investigations went, the minimum rain-fall in the valley of the Thames, and also pretty generally over England, and indeed all over the world, as compared with the maximum, was as one to two, and, as Mr. Clutterbuck had said, in any calculations it was necessary to take the minimum. Now, deducting one-third from the average would give the minimum, and adding one-third would give the maximum. So that, avoiding fractions, the minimum in the valley of the Thames would be about 16 inches, and the maximum about 32 or 33 inches. Down to 16 inches, therefore, they must bring their calculations, and he did not suppose Mr. Bailey Denton contemplated making reservoirs for more than 365 days' supply, about 120 to 200 days being generally considered sufficient by engineers. He regretted that a writer so well able, from his large experience, to handle this subject, should have used the word "compact" as describing the agreement made in the Act of Parliament between the Thames Conservators and the water companies. He did not think it was a proper word to use as applied to such a subject. He thought it rather implied that the public had been "sold" by that "compact."

The Chairman did not think the language implied that at all.

Mr. Rawlinson said he entirely justified the demand made upon the water companies; he had had as much to do with it as anyone, and if his advice had been taken the sum would have been doubled. Previously, the companies had Parliamentary powers to take the water without paying anything for it, and in the meantime the river was going to ruin in every possible way, weeds growing, channels choked up, shallows silted, all sorts of garbage allowed to be thrown in, and no scavenging whatever. The stipulation was that the Conservators should restore the river and cleanse it, so that in fact the companies had a cheap bargain of it, and the public were benefited by the transaction. With regard to the application of sewage, that also was a speciality of Mr. Denton's, but he thought a little further inquiry would teach him that sewage was clarified by a proper application to clay land, even if not underdrained, which Mr. Denton stipulated for. He (Mr. Rawlinson) by no means said the land should not be underdrained, but he could assure Mr. Denton that some persons, practically acquainted with sewage irrigation, would prefer, from their experience, to irrigate claylands without underdraining, if Italian rye grass, which was the most profitable crop, were to be sown. In this grass the roots were near the surface, and the silica of the clay combined with the sewage and tended to precipitate it. Experience showed that when such irrigation was judiciously carried on, although the process of assimilation did not proceed equally at all times, there was not a day in the year, winter or summer, when you could not beneficially place sewage on the land, and when that sewage would not come clarified from that land. That had been proved, and it was a very important fact. He sincerely hoped that Parliament would follow the advice given in the paper, and make sewage irrigation imperative on all towns which now tainted rivers with it, for it never would be done until the law was stringently applied. Parliament had yet to learn the immense importance of following up laws by strict supervision, so as to see that those laws which affected the whole community were effectively carried out.

Mr. Homersham said, with reference to the disappearance of four-fifths of the rainfall, that not only was he aware of that fact, but he knew a large district where it disappeared altogether.

Mr. Rawlinson remarked that if the water disappeared from the surface, it must come out again somewhere. The only conclusion he could come to was that it was lost by evaporation.

Mr. Homersham said the water went to the sea through underground fissures, being carried off by springs below high-water mark.

Professor Voelcker said he understood Mr. Denton to say that there were great difficulties in the way of sewage water that passed over land being perfectly purified. There was no doubt some truth in this statement, but if sewage farms were really properly managed the purification of sewage might be rendered perfect; inasmuch, however, as there were not these model establishments, and in many cases the water simply flowed *over* the land, the purification was generally very imperfect. It was far more difficult to get the water through the soil than was generally believed, especially on clay lands, where it often ran through the cracks, and did not actually go through the soil at all. Where properly managed, however, sewage water, after passing through the soil, became quite fit for ordinary uses and for drinking. There was one other purely chemical question on which he would make an observation—the organic matter in water. The writer of the paper thought it would be desirable to have a fixed standard for the amount of organic matter which should be present in water for drinking, and Mr. Homersham said that some water was perfectly free from these matters. Chemically that was not correct, as no natural water was absolutely free from organic matter, although to a non-chemical eye it might appear so. He thought it would be desirable to have something like a standard of purity, but, without knowing the kind of water, it would be extremely dangerous to fix such a

standard. He had had water for analysis which contained very little organic matter, and yet which he had no hesitation in pronouncing totally unfit for drinking, whilst other samples, which contained three or four times as much organic matter, were useful and wholesome. It was not so much the amount as the quality of the organic matter which was of importance, and hence the difficulty of fixing the standard by quantity. In practice, a very good test of the presence of injurious matter was to bottle off a portion of the water for a fortnight or three weeks, and then examine it, when, if the organic matter, however small in quantity, were in a state of decomposition, there would be an unpleasant smell. This was perhaps as good as any chemical test which could be applied. There were great difficulties in estimating with precision the quantity of nitrogen, as suggested by Professor Frankland. If that could be done it would be a step in advance, but as that could not be done, there would be very great difficulty in fixing a standard for the amount of organic matter which might be tolerated in drinking-water.

Mr. BOTLY, in explanation of a discrepancy between the amount of rainfall as stated in the report of the Royal Agricultural Society and that given elsewhere, stated that the reports were issued a considerable time after date. He also remarked, in reference to the cultivation of Italian rye grass, that where it was attempted without sewage irrigation, the soil was very much exhausted, in some cases causing the total failure of the succeeding crop.

Mr. NEATE, M.P., wished to call attention to what had been said by Mr. Homersham, which had made a considerable impression on his mind, about the unwholesomeness of water which had been stored. He had been one of those who had attached great importance to the storage of water in the valley of the Thames, but it now appeared from what had been said that this would be of very little value, because the water would not be wholesome. He thought this would much depend, however, on the way in which the water so stored was kept up. Was it to be merely by the overflow of the water in the river, or by the turning into it of streams in the summer season? If it were kept up in that way what advantage would be gained by turning those streams into reservoirs which would not be gained by turning them into the river itself? Mr. Homersham seemed to value the great chalk reservoirs, not so much by what they gave out as by that which they kept in. They all knew, however, that there was an immense amount of water in these chalk reservoirs, but its only value was when it was released therefrom.

Mr. TOWLE gave his opinion in favour of reservoirs, and remarked that it would be no new thing, there having been in the neighbourhood of Standlake and other places above Oxford (until draining and other agricultural works had destroyed them), immense natural reservoirs, which served to feed the stream in summer seasons, and which he, as a miller, now felt the want of very much. He also thought that better regulations for ensuring a perfect flow and scouring of the river would be very beneficial.

Mr. BAILEY DENTON, in reply, said that he had carefully avoided referring to what was known as his own scheme, or the project with which his name was connected, which was the utilization of the upper streams of the Thames in connection with storage. That would explain the omission of many details, as Mr. Homersham and Mr. Rawlinson would understand. The same explanation would apply to Mr. Clutterbuck's remark that averages of rainfall had very little to do with the question. He had himself frequently stated (he believed in that room) that the minimum rainfall was the real basis to be taken. With regard to the exception which had been taken to the use of the word "compact," he thought he could hardly have chosen a word less liable to an offensive interpretation; but, if it was thought desirable, he would withdraw it, and substitute the term "agreement" or any other term that might be preferred. Mr. Rawlinson's authority stood as high as that of any man in relation to the question of irrigation by sewage, but if he had understood him aright in saying that the drainage of such land was not necessary, he must, with the greatest respect, give a contradiction to such a statement. He considered it absolutely essential. With regard to the storage of water, he did not say that such reservoirs as Mr. Homersham had referred to would not be objectionable, but he had not at all gone into the question of what reservoirs would be desirable, if it were necessary to supply London direct from reservoirs. The whole of his observations on that and former occasions had tended towards conserving in winter the surplus water, in order to compensate the river in summer for what was taken out of it, the water not being supplied direct to the consumers from the reservoirs, but returned to the river. That perhaps would satisfy the gentleman (Mr. Neate) who wished him to refer to that point. At the same time, he must not be understood to hold that reservoirs could not be constructed in the valley of the Thames, in which water might be preserved for drinking purposes. He believed they knew very little about what might be done in that way, if there were proper means adopted for purifying the water, and that the conservation of water in large reservoirs of sufficient depth would tend to improve its quality, rather than to injure it.

The CHAIRMAN, in proposing a vote of thanks to Mr. Denton, said, that of course anybody with the experience of Mr. Homersham or Mr. Rawlinson could have added a great deal to the paper, and so could the writer himself had he not been restrained by the time at his disposal. It seemed to him that the paper had brought before them the prominent question on which the public must pronounce a decision before long. As to the question of the rainfall, he quite agreed with what Mr. Rawlinson had said, but that, after all, was a secondary consideration. The operations of nature were conducted on so vast a scale that anything man could do would not produce any perceptible effect, but still he should be very sorry if the local observations which had been conducted with such great care were discontinued, because they were of very great value. If, however, they were told that improved drainage increased the floods and the droughts, he said these questions were not worth a moment's consideration with reference to the great question of the supply of water to the river. They who knew what took place in the north and west of England, especially in mountain districts, knew very well that it was the great mass of water brought from the ocean to which they looked; and although the rain was largely absorbed before it came to this more southern locality, still it was practically to that source that we must look for a supply of water. Therefore, although it was very wise to make these observations, for all practical purposes they might be disregarded. He was reminded by this discussion of the answer which a celebrated engineer gave to the question of what use rivers were. He said their only use was to supply canals. So, in relation to this question, he should say that the use of valleys was to store water. He believed that there was an unbounded supply for the wants of man if they took the minimum water supply of any district, which, as had been said, might be taken at 16 inches; if all that were stored, it would be abundant for generations to come. He believed, from what he had heard in the course of professional experience—for he had no practical acquaintance with the subject—that water stored in large bulk was improved in quality. Where it was stored in small bulk and in shallow depths, it might become impure, but in larger quantities it was different. The observations of Mr. Homersham on the way in which water was stored in the chalk were most interesting, but, if this could not be got at, it was evidently wise to store what could be conveniently got at in the valleys. He would only say one word with reference to what Mr. Rawlin-

son had said on the question of the "compact." He thought the arrangements then made were very advantageous and desirable. If the water companies obtained large quantities of water from the river, which was to be brought into a proper condition, it was only right that they should contribute to the maintenance of that from which they derived this benefit. There was one larger question still in which many were interested, viz., the right of rivers to the water shed of the district. They had had that before them on a recent occasion with reference to the drainage of the Fens. There the water of the district had become essential to the maintenance of the rivers if navigation were to go on. In modern times, however, the question of navigation had become of less importance than drainage, although in an earlier stage of civilisation it might not have been so. Now that the main traffic of the country was carried on by means of railways—navigation, drainage, and water supply ought all to be kept distinct. The time was not far distant when, as they had seen with reference to the water shed of the Thames, the inhabitants of particular districts would become extremely jealous of water being transferred from one water-shed to another. A river had a right to the water naturally belonging to it, and the inhabitants of the district had a right to the use of it; but, inasmuch as they benefited from that very use, why should they not be taxed for the maintenance of it in a proper condition? Those were questions upon which we were just entering; and he believed that the paper they had heard was one great step towards the solution of them. Those who knew what the state of the Thames was some years ago, when old London-bridge existed, and Lambeth was supplied with water drawn from the river between Waterloo and Westminster bridges, would see that anything which was paid for the privilege of drawing the water from beyond the tidal influence was money equitably levied. Tidal influence was in fact created by the removal of old London-bridge; and there being now a totally new state of things, the money paid for their advantage was rightly paid, for a good supply of water to the metropolis could not possibly be bought at too high a price.

ARTIZANS' VISITS TO PARIS.

At a meeting of the Council of the Birmingham Chamber of Commerce, held on Wednesday, the 29th ult., a letter was read from the Society of Arts, inviting the co-operation of the Chamber in sending skilled artizans to Paris, "to study the Exhibition and principal manufacturing establishments of France." Mr. W. C. Aitken, a member of the Society of Arts Committee for promoting the visits, was present by invitation, and explained the merits and advantages of the Artizans' Visits to Paris, as projected by the Society of Arts; he also pointed out that much benefit might be anticipated from the reports the artizans sent were bound to write, and the advantages an inspection of the factories and workshops the Society would afford them facilities of visiting; he also showed the advantages which might be expected to result to industries which the artizans sent represented—their reports being confined to objects in their own trade. After considerable discussion as to the best mode of furthering the objects, the following resolution, moved by the Mayor (Mr. George Dixon), and seconded by Mr. Blews, was agreed to unanimously:—"That the proposition of the Society of Arts, of sending skilled workmen to the Paris Exhibition, to report upon the productions exhibited is approved of, and that an application be made to the members of the Chamber, and the manufacturers of the town generally, asking them to subscribe to a fund for the purpose, and also to recommend qualified men for selection by the Society of Arts." The members present gave their names as subscribers.

Mr. W. C. Aitken has also addressed a letter to Mr. John S. Wright, Vice-President of the Birmingham Chamber of Commerce, on the subject, from which the following are extracts:—

"Should the scheme be carried out it will be the Society of Arts Working Men's Excursion to Paris, the men selected to be sent being few in number, and representing the best, the most skilful and intelligent men engaged in the industries of our country. From Birmingham a selection should be sent of artizans engaged in the leading manufactures of the town. To defray their expenses contributions are solicited, and the intention in asking the Chamber of Commerce to co-operate is to give publicity to the movement, and receive contributions from its members individually, if the Chamber, as a body, has no funds at its disposal. The reports made by the artizans sent will be published, and thus become available, not only to manufacturers, but the general public; they will tell us alike of our strength and weakness, and of our vulnerable points. Whether the ideas entertained by the manufacturers of Birmingham about the Paris Exhibition are pleasing or not matters little; but one fact is certain—they have something to learn, and they have the means of learning it by sending a few of their best men to examine and report on the contents of the Paris International Exhibition. It should be known that other countries are more alive to progress than ourselves, and to each exhibition held in this country foreign artizans have been sent by the governments under which they lived. On the authority of Dr. Lyon Playfair, we are told that Continental and other countries, except our own, since the International Exhibition of 1862, have made rapid progress, which is visible in the products of industry exhibited at Paris, contributed by other competing countries. If such, then, is the case, as I believe it really is, it is the duty of English manufacturers to take every legitimate means to acquaint themselves of what has been done and is being done; and no method can be more legitimate and proper than through the instrumentality of artizans, intelligent and skilful, who, by practical experience, are able to and will detect differences which even their employers would pass over unheeded and unnoticed.

"Under the impetus given by exhibitions, the industries of Birmingham have been improved in their ornamental features, and the processes by which the articles have been produced have been facilitated and improved. Industrial education is now the order of the day in those countries which compete with us; the results of such teachings are manifested in the works exhibited. I am glad to say that among the students attending the Midland Institute of our town there are those whose habits of observation have been so quickened, their intelligence so educated, as to render them well fitted to visit and report on the contents of the Exhibition already named.

"I view the matter as a very important one, not lightly to be passed over. Gentlemen connected with your Chamber may differ from me as to its utility or not, but I am well convinced, from personal acquaintance with the manufactures of Birmingham, that every available means of getting information should be taken advantage of; and if what is seen is new and useful, it should be applied to and in the special industry it may be supposed to benefit.

"P.S.—Appended is the probable number of artisans engaged in Birmingham trades which it might be considered advisable to send:—

"Two artisans engaged in button making. One to report on the tool making; one to report on the ornament, style, and varieties of buttons exhibited.

"Two artisans engaged in brassfounding, to report on brass and bronze casting generally; cabinet, and general brassfounding; on bells, and plumbers' brassfounding; on rolled brass, wire, sheathing, tube making; on lamps, gas fittings, and naval brassfounding. One

to report on style and ornament; the other on quality and construction.

"One artisan engaged in the manufacture of electro-plate, or plated goods; to report particularly as to Russian products in silver work, and in reference to niello and enamels associated with works on the precious metals generally.

"One jeweller, to report also on gilt toys, chains, &c.

"One artisan engaged in the production of tools generally, who also has a knowledge of engineering connected with the construction of machines used in manufactories.

"Two gunmakers.

"One japanner, acquainted with the processes of japanning, has artistic taste, and is also acquainted with the manufacture of papier maché; also to report if there are any substitutes for that material, and ascertain what they are.

"One stamper of metal, to examine as to the various processes employed in raising up thin sheet metal, as cornices and other stampings, &c.

"One steel-toy or edge-tool maker.

"One tin-plate worker, to report also on copper goods."

THE ALBERT HALL OF ARTS AND SCIENCES.

In reply to a letter in the *Times*, signed "Inquirer," Lieut.-Col. Scott, R.E., Secretary to the Provisional Committee, gives the following information in reference to this undertaking:—

"First, the Prince Consort did not state, as 'Inquirer' thinks, that 'no steps should be taken for the erection of the Hall of Arts and Sciences until the public had shown its sympathy with the proposal by subscribing £200,000,' but Her Majesty's Commissioners for the Exhibition of 1851 named £150,000 as 'the amount required to be raised by subscription before the public would be entitled to claim the benefit of the offer made by the Commissioners.'

"Secondly, as regards the popularity of the undertaking, the issue of the prospectus was commenced in the last week of November, 1865. By the end of January, 1866, £50,000 had been subscribed by the public, and in the April following this amount had risen to £100,000. The monetary panic soon afterwards induced the Provisional Committee to abstain from any further issue of the prospectus, but the success obtained in so short a time appeared to them to justify their acceptance of Messrs. Lucas's liberal offer to make up the subscription list to £150,000, and to take the contract for the works at ordinary trade prices. The Commissioners were also satisfied with these conditions, and consequently granted the site for the Hall, and guaranteed to take up sittings to the value of £50,000, in anticipation of a demand for them by the public.

"At present the subscription list stands thus:—The sum required for the undertaking is £200,000, and there has been subscribed by various persons £112,200, by Messrs. Lucas £38,000, and by Her Majesty's Commissioners £50,000; the sittings taken by Messrs. Lucas, as well as those taken by the Commissioners, being still at the command of the public.

"Thirdly, in reference to the 'curious fact' observed by 'Inquirer,' 'the total absence of the representatives of the numerous scientific societies of London' at the ceremony of laying the first stone of the Hall, I can vouch that, though his eyes failed to detect them in the vast assembly, invitations to the ceremony were accepted by the presidents of most of the leading scientific as well as artistic societies of the metropolis."

PARIS EXHIBITION.

It has been remarked, and with truth, that the British section of the exhibition is extremely unequal, some classes being fully represented, while others are sadly deficient; but the remark arises, in a great measure, from the adoption of a false standard of comparison. Compared with other countries than France, England probably exhibits no more inequality than her neighbours. France is at home, and exhibits for her internal as well as external trade, and it is too much to expect manufacturers or merchants to take upon themselves the cost and trouble of exhibiting productions for which there is no market on the Continent. It is the business of governments and commissions to collect and show that which has only a general industrial, scientific, or artistic interest apart from commerce, and although there are some evident deficiencies, the Admiralty, the War-office, the South Kensington Museum, the Post-office, and other public establishments have done much to supply this desideratum.

Amongst the most remarkable omissions is that of the Transatlantic telegraph cable and its accessories. Since the last international exhibition no nation has achieved an act of higher practical difficulty, of larger results, or one which has obtained the same amount of admiration and applause; and it is certainly one of the strangest facts connected with this exhibition that the union of the old and new worlds by two electric cables should be totally without record on such an occasion.

Last week a short account was given of the contents of the first-class of the fifth group, mining and metallurgy; we will now visit the remaining classes of this group.

Class 41.—Forest products and the trades appertaining to them is very poorly represented, and this is not surprising, as it includes scarcely any articles of Continental demand; four exhibits of woods, veneers, and objects in wood; a collection of paper-making materials by W. H. Clarke, and one of fibres and woods of Mr. P. L. Simmonds, both of London, and illustrations of the late Capt. Fowke's experiments on timber, make up the whole list.

Class 42 is scarcely represented at all. Messrs. G. F. H. Clark and Co., of London, have, however, a good show of raw and manufactured resins and gums; and Mr. Ward a splendid case of stuffed birds.

Class 43—Agricultural products, not alimentary; this class is but little richer, there being only three exhibitors of wool, one of flax, &c., four of oils and grease, one of cigars, and one of compressed fodder.

Class 44—Chemical and Pharmaceutical products, is, on the contrary, not only fully but admirably represented; there are more than a hundred exhibitors in this class. The chemical and pharmaceutical exhibits proper number about thirty-five, and include many of the rarest products of, and some of the finest examples in the Exhibition of the chemicals of commerce. There are more than a dozen exhibitors of colours, dyes, and varnishes, who represent a very important branch of manufacture.

The starch manufacture is represented by four well-known firms—Berger and Co., Colman, Orlando Jones and Co., Beckitt and Sons; and the beauty of the prisms and the admirable manner in which the products are exhibited call forth high praise. It should be mentioned, however, that Messrs. Berger have their chief show of this article in the food court.

There are more than half a dozen exhibitions of candles, wax, spermaceti, &c., and nearly as many of soap. The amount of science which has been brought to bear of late years in the manufacture of these articles, and their enormous importance in an industrial as well as general point of view, give great interest to this portion of the British section.

Class 45—Bleaching, dyeing, printing, &c., can scarcely be said to be represented at all.

Class 46 is also weak, but there are some very fine specimens of enamelled leathers.

The food group is closely allied to the preceding, but will be found in the outer zone of the building, with entrances from the great machinery court. It is perhaps on the whole the worst represented in the British side; it is lamentably deficient.

Class 67—Cereals, &c., can scarcely be said to be represented at all, and there are two or three exhibits of hops which would have been more in place in the fermented liquors class.

Class 68 includes four exhibitors of biscuits.

Class 69 is a blank. This is incomprehensible; English cheese is in great esteem in France; it is to be seen in all the best shops and at most restaurants. At the two cheese exhibitions held in Paris, every English exhibitor who has contributed has received a medal, yet there is not a single English cheese in the food department. An equally extraordinary omission occurs in the next class—meat and fish; while English ham and bacon are in constant demand in Paris, and while France and several foreign countries show those articles largely, there is not one exhibitor on the British side. Again, although the question of preserved meats has been so much discussed of late, and so many important experiments have been made towards applying the surplus meat of one hemisphere to the wants of the other, there are scarcely any indications of this on the British side of the exhibition. Mr. Morton has a good show of preserved provisions; Mr. Warriner shows two joints preserved raw; Messrs. Dufaville, Sansom, and Co. show a preparation of beef tea; meat preserved in paraffine is exhibited by Mr. Redwood's Company and by Mr. Young, and the *Extractum carnis* (Liebig) by Messrs. Allen and Hanburys, the two last-named being in the chemical class. Preserved fish is represented by one exhibitor, Mr. Austin, of Dublin, who shows a case of bloaters and another of sprats.

It is not surprising that the class of vegetables and fruit is empty; the few articles of this kind which England could show are included in the general collections of the next class—Condiments and stimulants—in which salt, mustard, pickles, extracts from spices, and other matters, are fairly represented. The last class in the group, that of fermented liquors, is represented by nine or ten ale-brewers, and a very few samples of cider, vinegar, whiskey, and cordials. These last two classes are, however, very largely represented at the Exhibition, for the articles shown in them are to be found at nearly every restaurant and buffet in the Champ de Mars.

THE PARIS EXHIBITION AND INDUSTRIAL EDUCATION.

The following letter appeared in the *Times* of the 29th ult.:—

Sir,—After the distribution of prizes at the London University this year, I made some remarks on the lessons which the late war in Germany and the present Exhibition at Paris afforded to us, if we wish to hold our own with other nations in the arts of peace and war.

I quoted a speech of the President of the Civil Engineers as to the superior progress made in machinery by foreigners. I spoke from the information which I had received from a gentleman intimately acquainted with the iron trade as to the greater improvements made in the manufacture of iron in France, Belgium, Germany, and Austria. It was only from general report that I stated the little advance we have made in most departments of industry, excepting those of furniture, glass, and china.

Since then I have seen the enclosed letter from Dr. Lyon Playfair. The subject is important, and his authority is great. I have therefore obtained his permission and that of Lord Taunton to ask you to publish it.

The inquiry of 1853, to which Dr. Playfair alludes, was chiefly owing to the information given him by the Prince Consort, than whom no one was more keenly alive to the want of generally-diffused scientific instruction in this country, or more active in stimulating all classes to remedy the defect.

I am, Sir, your obedient servant,

Granville.

16, Bruton-street, W., May 28.

From Dr. Lyon Playfair.

London, May 15, 1867.

My Lord,—As you desire that I should put in writing the substance of the conversation which I had the honour of having with your Lordship this morning, I willingly comply with your request.

I have just returned from Paris, where I acted as a juror in one of the classes of the Exhibition. In this capacity I had no other opportunities than any other juror of forming a judgment in regard to it; but, having had the charge of the working of the juries in the Exhibitions of 1851 and 1862, I naturally made the acquaintance of many eminent men of different nations, and, meeting with a large number of them congregated on the International Juries in Paris, I endeavoured to gather their opinions as to the position which England occupied in this great industrial competition.

I am sorry to say that, with very few exceptions, a singular accordance of opinion prevailed that our country had shown little inventiveness and made little progress in the peaceful arts of industry since 1862. Deficient representation in some of the industries might have accounted for this judgment against us, but when we find that out of 90 classes there are scarcely a dozen in which pre-eminence is unhesitatingly awarded to us, this plea must be abandoned. My own opinion is worthy only of the confidence which might be supposed to attach to my knowledge of the chymical arts; but when I found some of our chief mechanical and civil engineers lamenting the want of progress in their industries, and pointing to the wonderful advances which other nations are making; when I found our chymical and even textile manufacturers uttering similar complaints, I naturally devoted attention to elicit their views as to the causes. So far as I could gather them by conversation, the one cause upon which there was most unanimity of conviction is that France, Prussia, Austria, Belgium, and Switzerland possess good systems of industrial education for the masters and managers of factories and workshops, and that England possesses none. A second cause was also generally, though not so universally, admitted, that we had suffered from the want of cordiality between the employers of labour and workmen, engendered by the numerous strikes, and more particularly by that rule of many Trades' Unions, that men shall work upon an average ability, without giving free scope to the skill and ability which they may individually possess.

"Dumas, well known as a '*savant*,' and who, from his position as a senator of France and President of the Municipal Council, has many opportunities of forming a correct judgment, assured me that technical education had given a great impulse to the industry of France. In going through the Exhibition, whenever anything excellent in French manufacture strikes his attention, his invariable question is, 'was the manager of this establishment a pupil of the Ecole Centrale des Arts et Manufactures?' and in the great majority of cases he receives a reply in the affirmative. General Morin, so well known as the Director of the Conservatoire des Arts et Metiers, has lately sat on a commission to examine into the state of technical education in other countries, and to extend it in France, and he informed me that their recommendations were likely to be promptly and largely acted upon. I mention for your lordship's information that General Morin was of opinion that the best system for the technical education of workmen is to be found in Austria, though the higher instruction of masters and managers is better illustrated in France, Prussia, and Switzerland.

In 1853 I published a little work on "Industrial Education on the Continent," in which I pointed out that, as an inevitable result of the attention given to it abroad, and its neglect in England, other nations must advance in industry at a much greater rate than our own country. I fear that this result is already attained for many of our staple industries. But as my opinion is only that of an individual, I trust that it may accord with the objects of

the commission over which your Lordship presides to take the evidence of some of the leading jurors, many of whom had as good opportunities as myself of judging of the position which our country has taken in this great international competition.

Permit me also to make another suggestion. My inquiry of 1853 into industrial education on the Continent was a private one, and had neither official aid nor sanction, and is now antiquated. It would be important that the Government, either through your Commission or through the Committee on Education, should hold an official inquiry on this subject, and should tell the people of England authoritatively what are the means by which the great States are attaining an intellectual pre-eminence among the industrial classes, and how they are making this to bear on the rapid progress of their national industries.

My Lord, I have, &c.,

Lyon Playfair.

The Right Hon. Lord Taunton.

In reply to Dr. Playfair's letter, the following communications, the first under the well-known signature of "Y," and the second by Dr. David S. Price, have likewise appeared in the *Times* :—

Sir,—In the letter of Lord Granville which you have published to-day is the following sentence :—"I spoke from the information which I had received from a gentleman intimately acquainted with the iron trade as to the greater improvements made in the manufacture of iron in France, Belgium, Germany, and Austria." Now, Sir, if this conclusion—namely, that greater improvements in the manufacture of iron have been made on the Continent than in this country, be drawn from the representation of that manufacture in the present International Exhibition in Paris, I assert that it is wholly fallacious, and for the plain and obvious reason that there is no representation properly so called of that manufacture in the French Exhibition. The reason for this is not far to seek. Our great practical metallurgists have now gained considerable experience as to the economic result of such Exhibitions to themselves, and the fact is "the thing does not pay." I know this from extensive correspondence with men who have figured prominently in that capacity at previous Exhibitions. Men engaged in the smelting and manufacture of metals are actuated by one object, and that is gain. It is only dreamers who imagine the possibility of other motives guiding the men of business in this country. Indeed, if it were otherwise, in these days of keen and constant competition, ruin would be inevitable. Were it necessary I could adduce examples of the actual pecuniary loss which has accrued to exhibitors of established reputation numerous enough to justify my assertion on this point.

But, Sir, Lord Granville's informant does injustice to his countrymen. It may be demonstrated that nearly all the great improvements in the smelting and manufacture of iron have been made in great Britain. Who invented puddling, whereby coal was made available for the conversion of pig-iron into malleable iron? Who invented grooved rolls, whereby the puddle-ball may, without the tedious process of hammering, be drawn out into bars? Who first succeeded in substituting coal for charcoal for the smelting of iron? Who suggested the hot blast, whereby great saving of fuel in the blast furnace is effected? Who introduced the process of casting steel? The credit of all these mighty improvements, for mighty indeed they are, is due to English and Scotch men. Such improvements are really epochs in the metallurgic industry of the world, and it is not to be expected that achievements of this magnitude will crop up in time for International Exhibitions occurring in such quick succession as of late. But, Sir, let me direct your attention to the invention of Mr. Bessemer, which dates from 1856, and which is only now acquiring its full development. That invention has already revolutionized the manufacture of iron throughout the world, and is of far greater value to mankind than all the improvements in the manufacture of iron put together, of which France, Belgium, Germany, and Austria can boast, and Mr. Bessemer is an Englishman. It is a great invention, and if Great Britain had only produced one such in a century she would have maintained her rightful position in respect to improvements in the manufacture of iron. The products of that single invention, displayed in the Exhibition in London in 1862, may be regarded as of infinitely greater account than all the objects illustrative of iron metallurgic skill in the present exhibition in Paris, or, I may add, than all that have been shown in all the Exhibitions which have been held. And yet, forsooth, we are beaten by the iron manufacturers of the Continent in the sphere of improvement!

In particular and subordinate departments of the manufacture of iron we are, doubtless, excelled, and that, too, where dexterity of manipulation is largely concerned, as in the rolling of girders. But let the demand for such girders be increased, and we shall produce them you may be assured. Only a very few years ago the demand for large armour-plates was created. Who has supplied that demand? And is it not the fact that mills have been constructed in England which regularly turn out sound plates of such enormous dimensions as even in 1860 would have been considered impossible? Where else are such plates manufactured? Yet we are beaten in the manufacture of iron!

There is another point which should be noted. It is that great improvements may occur in the smelting of iron or other metals which cannot be illustrated in Exhibitions. Thus, suppose a modification in the inner form of a blast furnace, in its relative dimensions, in the composition of the charge, and in the mode of driving, as it is termed, whereby equally good pig-iron can be made cheaper than heretofore. That, Sir, you will admit, must be an important improvement. It is true a model and a few specimens of the pig-iron ticketed with the price might be sent; but they would not more adequately represent the improvement, in an Exhibition sense, than a description of it on a piece of paper. They would not appeal to the eye like a large girder, a massive ingot of steel, or an enormous armour-plate. And since 1862 we have certainly effected improvements in that direction. You will bear in mind that some weeks ago I privately placed this view of the matter before you.

In conclusion, Sir, I think I may say, without the charge of egotism, state that, like Lord Granville's informant, I also have had the opportunity during many years of carefully watching and becoming intimately acquainted with the state of the iron manufacture on the Continent of Europe as well as America, and I have no hesitation in expressing my conviction that we have no reason to be disheartened as to our position with respect to that great industry. I would neither croak nor exult. If there be cause for misgiving, it will be found in the unreasonable and mischievous machinations of paid Trades' Union agitators, who may, unhappily, succeed in diverting capital from the mills and forges of England to those of foreign countries.

I am, Sir, your obedient servant,

May 29. Y.

Sir,—In justice to British inventiveness, disparagingly alluded to in the *Times* of to-day, it is right that attention should be drawn to a very important fact—namely, that the greatest discoveries in applied chymical science of the last 20 years, and possibly of the present age, have been made in this country and by Englishmen.

To those conversant with industrial progress it will scarcely be necessary for me to state that I allude to the Bessemer process and to the aniline dyes, popularly known as the coal-tar colours. It is not for their discovery only that we are indebted to Englishmen, but for their industrial development also. At Paris these new branches of industry, the future influence of which upon trade can scarcely be foreseen, are not represented by

those who have had the greatest share in their development, while in the foreign courts beautiful series of specimens, for the knowledge of the production of which the exhibitors are mainly indebted to British skill, are displayed to the greatest possible advantage.

In 1862 Mr. Bessemer made a magnificent exhibition of what his process could effect. At Paris in 1867 he is content to let other men and many nations show how and with what success they have adopted his process. No aniline dyes are exhibited by our manufacturers, although it is well known that they are the first in the world. It will, therefore, be seen that it is very difficult for the public to draw any inference as to the state of these two important manufactures in England from what they find exhibited at Paris. Whether, in a national point of view, it would have been right to see that our country was correctly represented in her industries, and an erroneous impression as to her skill rendered impossible, is a matter upon which I need not enter.

Dr. Playfair, in his letter to Lord Taunton, recommends that further inquiries should be made into the educational systems of the Continent. Should the suggestion be adopted, I would venture to advise that an inquiry of equal importance for the success of industrial progress should be coupled with it, and that is, as to the working of the Patent Laws in France and Germany and the relations existing between inventor and manufacturer, which it is much to be regretted are not well understood here.

I have the honour to be, Sir, your obedient servant,

David S. Price.

26, Great George-street, Westminster, May 29.

Commerce.

The Cotton Trade.—Mr. Sam Mendel's circular for the 1st June, says that the continued high cost of cotton, compared with the prices ruling for yarns and goods, still leaves the millowner in a very unenviable and unsatisfactory position, and it is only by some decided improvement in our home-trade consumption, or by a reduced production, that relief can be looked for. From the first-named source, there has been, within the last few days, some indication of amelioration, and it is to be hoped that this will not only continue but increase to an extent that will serve to diminish the recent and still-continued heavy exports to India. Fortunately, the Indian markets have proved to be in a healthy and strong position, from previous short supplies and the better condition of the native population to consume the fabrics from this district. Yet it is now becoming an anxious question as to how far supplies can continue without producing repletion.

Colonies.

Queensland Imports and Exports.—The total value of the imports and exports of the colony of Queensland from and to each country during 1866 was as follows:—

	Imports.		Exports.
Great Britain....	£ 742,884	....	£ 321,939
Australia.....	1,711,895	....	1,025,377
New Zealand	—	....	2,541
Germany	3,921	....	—
India	—	....	3,630
Ceylon.....	—	....	14
Java.....	9,059	....	12,752
Miscellaneous..	148	....	253
	£2,467,907	....	£1,366,506

The sum of £421,325, which is laid out in foreign markets, chiefly English, for the supply of apparel and drapery goods, is equal to one-half of the whole annual export of wool; and the money that goes out of the colony in payment of the freight on these goods is no inconsiderable sum. At present the colony exports the staple for the fabric of most of the clothing required, and in return it gets woollens and cottons of very inferior descriptions. Every man, woman, and child spends the sum of £9 annually in clothing.

Bowen, a New Settlement in Queensland, has now a population of about 1,500. This is another instance of the speedy rise of colonial towns, and of one which has not received an impetus from any extraneous cause, as the exports up to the present time have been confined to pastoral produce only. The value of imports in 1866 amounted to £78,200; exports, £42,437. Since the settlement of Bowen, the country to the northward has been steadily taken up by squatters, so that a new comer cannot obtain any land between this and the Gulf of Carpentaria, unless he pushes out to the westward. Notwithstanding the tropical climate, sheep and cattle do very well with ordinary care and management. The whole is being most rapidly stocked. The increase on the whole is very satisfactory. Considerable excitement exists regarding gold at Bowen just now. A small party have been at work for months past, whose object was supposed to be working of copper, which is said to exist in the neighbourhood. There has of late been a suspicion that a more valuable metal than copper has been attracting them, and this has proved to be the case, as the parties have come forward to ask a reward for the discovery of a suitable gold field, of which Bowen will be the port, the distance being about 100 miles, with a good road. Bowen has the advantage of a most superior harbour and magnificent bay, a harbour which is only surpassed in the colonies by that of Sydney. There is also the advantage of an extensive jetty, alongside of which steamers and vessels of moderate draught can now lie, and which, by a little extension, could be made available for any ordinary merchantman.

Notes.

Aeronautical Experiments in France.—A scientific commission, including members of the French Institut, the Observatory, and the College of France, has just been formed for the purpose of drawing up a programme of experiments to be carried out with M. Nadar's great ballon, the *Géant*, and a smaller one called the *Cylindre*. Amongst the members of this commission are—MM. Regnault, president; Sainte Claire-Deville, Marie-Davy, and Sourel, of the Observatory; Laussedat, of the Ecole Polytechnic, and Renon. The Reverend Father Secchi, director of the Roman Observatory, now in Paris, and who exhibits a very ingenious electro-magnetic meteorological register, has offered his services to the commission. It is expected that the great capacity of the *Géant* will allow more complete experiments being carried out than has hitherto been possible; instruments are being prepared, and the first ascent is announced to take place from the park of the Exhibition, in a few days. It is not yet known who is to conduct the experiments.

National Monetary Conference.—It is said that the French Government has invited the European powers to attend a conference to be held in Paris on the 17th instant, to take into consideration the question of an international system or arrangement, and that England, Portugal, Spain, Belgium, and Switzerland have promised their co-operation.

MEETINGS FOR THE ENSUING WEEK.

Mon..... R. United Service Inst., 8½. Vice-Admiral G. Elliot, "On the Hydraulic Propeller as a Motive Power for Ships."

Tues ...R. Medical and Chirurgical, 8½

Photographic, 8.

Ethnological, 8. 1. Mr. F. Boyle, "On the Free Indian Tribes of Central America." 2. Mr. J. Crawfurd, "On the History and Migration of Cultivated Plants in reference to Ethnology—Spicerias." 3. Col. Phayre, "On the Tenure and Distribution of Landed Property in Burma."

R. Horticultural, 3. General Meeting.
WED ...Microscopical, 8.
R. Literary Fund, 3.
R. Society of Literature, 8½. Dr. C. M. Ingleby, "On the Unpublished Manuscripts of Samuel Taylor Coleridge."
Archæological Assoc., 8½.
THUR ...Syro-Egyptian, 7½. Dr. Camps, "On the Demoniacs, or possessed, mentioned in Holy Scripture. Were they Epileptic?"
FRI .....Astronomical, 8.
R. United Service Inst., 3. Capt. H. Barber, "The Organisation of the Indian Army."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 29th May, 1867.

168. Bill—Tyne Pilotage Act (1865) Amendment.
170. ,, Houses of Parliament (amended).
171. ,, Metropolitan Police.
292. Constabulary (Cornwall)—Return.
303. Lighting and Buoying (Ireland)—Return.
308. Navy (Iron Ballast)—Report of Dr. Percy.
312. Postal Services (India and China)—Return.
326. Public Works Loan Commissioners—Return.
Public Petitions—Twenty-sixth Report.

Delivered on 30th May, 1867.

158. Bill—Petit Juries (Ireland) (amended).
169. ,, National Gallery Enlargement (amended).
306. Justices of the Peace—Return.
320. Military Savings Banks—Account.

Delivered on 31st May, 1867.

166. Bill—Municipal Corporations (Metropolis).
173. ,, British White Herring Fishery.
46. (IV. Trade and Navigation Accounts (30th April, 1867).
300. Slave Trade—Return.
325. Corrupt Practices at Elections—Returns.

Delivered on 1st June, 1867.

172. Bill—Public Works Loans.
174. ,, Mines, &c., Assessment (amended).
324. Army (Gun Factories)—Balance Sheets (1861-62).
329. Limited Liability Acts—Report.
331. Population of Counties—Return.
Jamaica—Further Correspondence.
Public Petitions—Twenty-seventh Report.

Delivered on 3rd June, 1867.

175. Bill—Vaccination (amended).
315. West India Mails—Return.
316. West Indian Mails—Return.
317. Superior Courts of Law—Return.
332. Revenue and Population—Return.

Delivered on 4th June, 1867.

176. Bill—Limerick Harbour (Composition of Debt) (amended).
298. Shannon and Suck Rivers—Report of Mr. J. Lynam.
309. John Carroll—Memorials.
311. Copper, &c.—Return.
327. Military Knights of Windsor—Statutes.
Luxembourg—Treaty.
Luxembourg—Protocols of Conferences.
Luxembourg—Correspondence respecting the Grand Duchy.

Patents.

From Commissioners of Patents' Journal, May 31st.

GRANTS OF PROVISIONAL PROTECTION.

Axle-boxes, &c.—1429—A. V. Newton.
Axles—1404—J. Watkins.
Beer-engines—1490—H. A. Dufrené.
Belts, ladies'—167—J. M. Stanley.
Boilers—1401—J. Steven.
Boilers—1419—E. Field.
Book-rest—1482—E. O. and W. T. Hallett.
Breaks, coupling—1373—T. A. Weston.
Breaks, railway—1420—J. Clark.
Brick-making machines—1393—W. Clark.
Buffer springs—1369—T. A. Weston.
Cards, &c.—1402—T. Nelson.
Cartridge holders—1413—J. Leetch.
Cartridges—1381—G. Jeffries.
Cartridges—1484—W. E. Gedge.
Case, medical instrument—372—E. A. Kirby.
Casters—1406—W. R. Lake.
Charcoal, revivification of—1415—W. Cormack.
Coffee pot—1375—T. Brown.
Collars for horses, &c.—1343—R. Smith.
Cutlery—1101—E. Stevens.
Cutlery—1359—J. Nixon and J. Winterbottom.
Egg beater, &c.—1374—T. Brown.
Egg boilers—1424—B. Barrett and H. Mackenzie.
Engines, rotary—1383—F. B. Dœring.
Evaporators—1416—W. E. De Bourran.
Explosive compounds—1345—W. E. Newton.
Fabrics—1298—S. Thacker.
Fibrous materials—1166—G. Bernhardt.
Fire-arms, breech-loading—1339—W. W. Greener.
Fire-escapes, &c.—1418—M. D. Rogers and J. Wilson.
Fishing apparatus—1331—S. E. Hallett.
Fishing apparatus—1333—S. E. Hallett.
Food, mixing—1385—R. Mellard.
Furnaces—1409—J. G. N. Alleyne.
Gas, &c.—1272—P. Salmon.
Gun barrels, boring—1400—J. Piddington.
Gunpowder—1408—G. A. Neumeyer.
Heat, transferring—1478—H. A. Dufrené.
Hoops, wooden—1341—E. Faucher.
Iron, &c., welding—1377—W. E. Newton.
Lead, white—1464—W. R. Lake.
Levels—1218—J. W. Cochran.
Locks, &c.—1353—H. J. Saxby.
Looms—1387—A. Cooper.
Looms—1414—C. Eastwood.
Looms—1468—E. Webb.
Looms—1488—J. Bottomley.
Lubricators—1337—J. Booth.
Metal cocks, &c.—1407—W. R. Lake.
Metals, &c., preparing—1411—G. Lunge.
Musical instruments—1280—J. Smyth and S. Kirby.
Oils, extraction of—1472—T. Richardson.
Paper presses—1365—R. and A. Wood.
Paving—1476—B. Sheil.
Pianos—1376—A. Herce.
Printing machines—1361—T. J. Mayall.
Ranges—1305—R. Russell.
Scales—1397—J. Walker.
Sewing machines—1399—G. Browning.
Sewing machines—1410—R. H. Padbury.
Sewing machines—1462—J. Smith.
Ships' propellers—1423—C. Randolph.
Ships, &c., armour-plated—1417—J. W. Butler.
Ships, &c., toy—1367—A. Fournier.
Shutters—1480—J. Smith and J. L. Ibbotson.
Signals, railway—1422—A. H. Colles.
Textile materials, bleaching—1403—W. Clark.
Trowels—1321—J. Ball.
Valves—1335—E. Bourdon.
Water-closets—1371—J. Bowden.
Water-closets—1426—J. G. Jennings.
Winding machines—1357—J. Gaskell.
Winding machines—1391—J. Combe.
Windlasses—1428—E. Walker.
Wood, working—1366—S. W. Worssam.
Wool, &c., combing—1363—G. E. Donisthorpe.
Yarns—1405—J. W. Dalby and P. Constantine.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Motive-power apparatus—1575—H. A. Bonneville.
Stone-dressing machines, &c.—1566—W. Snell.
Wool, weaving—1577—H. A. Bonneville.
Wool, &c., carding—1576—H. A. Bonneville.

PATENTS SEALED.

3162. H. Bateman.
3165. S. J. Browning.
3179. J. A. Coffey.
3194. J. M. Worrall.
3199. V. Vandroy.
3200. J. Toward.
3204. F. Palmer.
3207. W. Clark.
3240. W. H. Biggleston.
3261. T. H. Cooper.
3336. M. Henry.
3354. W. E. Newton.
68. J. Silvester.
224. H. A. Bonneville.
914. W. Wood.

From Commissioners of Patents' Journal, June 4th.

PATENTS SEALED.

3195. C. E. Brooman.
3196. R. and H. Harild.
3201. H. F. Swears.
3210. R. Duncan.
3215. J. Darling.
3218. R. Ackroyd and W. Maud.
3220. F. W. Turner.
3226. A. C. Fraser.
3229. W. A. Richards.
3230. J. McGlashan.
3231. R. Smith and J. Ramage.
3234. H. C. Lucy.
3235. T. Chaloner & J. Billington.
3236. W. Robertson and C. J. Waddell.
3265. S. Chatwood.
3288. H. Brinsmead.
3295. C. Randolph.
3297. S. Chatwood & J. Sturgeon.
3299. G. Bertram.
3316. M. Weber.
3367. M. Weber.
42. J. V. y Jové.
94. A. H. Brandon.
345. S. Howard.
1153. W. Harrison.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

1326. J. Dickson.
1352. W. and S. Firth.
1541. H. Phillips.
1373. R. A. Brooman.
1384. W. E. Newton.
1394. G. Coles, J. A. Jaques, and J. A. Fanshawe.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

1336. W. E. Newton.
1337. W. R. Bowditch.
1357. C. W. Lancaster, J. Brown, and J. Hughes.
1408. G. A. Waller.

Journal of the Society of Arts.

FRIDAY, JUNE 14, 1867.

Announcements by the Council.

ANNUAL CONFERENCE.

The Sixteenth Annual Conference between the Council and the Representatives of the Institutions in Union and Local Boards will be held on Wednesday next, the 19th June, at Twelve o'clock, noon. The Right Hon. HENRY AUSTIN BRUCE, M.P., will preside.

The Council will lay before the Conference the Secretary's Report of the Proceedings of the Union for the past year, and the Results of the Examinations, and the Programme of Examinations for 1868 will also be considered by the Conference.

The following suggestions of Subjects for Discussion have been received from various quarters, it being understood that in putting them forward the Council express no opinion whatever upon them :—

1. Whether the means at present available for the promotion of Primary Education are sufficient to qualify the working classes to take advantage of the Secondary Instruction offered by Institutes to Adults ?

2. Whether provisions should be inserted in the Manchester Education Bill, now before Parliament, which would authorize grants to be made to Evening Schools and Classes ?

3. Whether, considering the valuable results of the co-operation which the Royal Horticultural and Geographical Societies, and certain public companies, have afforded to the Society of Arts in extending the sphere of its Examinations, the like co-operation cannot be obtained from other societies and companies, especially from the Royal Agricultural and Botanical Societies ?

4. Whether any additional means can be devised to induce the Institutions to form District Unions, with paid Visiting Officers, in connexion with the Society of Arts ?

5. Whether additional interest in the Final Examinations might not be excited by the establishment of Special Prize Funds in the District Unions, to which Supplementary District Prizes might be added by the Society of Arts ?

6. What means can be adopted by the Local Boards to secure a larger number (*a*) of Candidates from the Artizan Class at the Final Examinations, and (*b*) of Female Candidates at the Elementary and Final Examinations ?

7. Whether it would be expedient to adopt, as far as possible, one specified text-book for each of the subjects in the Final Examinations ?

8. Whether it would be expedient that the Society of Arts should decline to recognize an Elementary Certificate of any given year as a Pass to the Final Examinations of the same year ?

9. Whether it is desirable, in the Elementary Examinations, to have one set of papers instead of two, as at present, but with two grades of Certificates, according to the merit of the Candidates ?

10. Whether, in order to secure uniformity in the Previous Examinations, the Society of Arts should furnish an Elementary Paper (distinct from the Ordinary Elementary Examinations) to meet the case of those Candidates who may not, in any previous year, have obtained Elementary Certificates ?

11. Whether any steps can be taken by the Society of Arts, in order to prevail upon the Science and Art Department to grant Honorary Teachers' Certificates to those gentlemen who shall be recommended by any Public Educational Board ?

12. How can the Institutions or District Unions assist the movement now being made by the Society of Arts to send selected Workmen to Examine and Report upon the Paris Exhibition ?

Secretaries of Institutions and Local Boards are requested to send, immediately, the names of the Representatives appointed to attend the Conference, and early notice should be given of any other subjects which Institutions or Local Boards may desire their Representatives to introduce to the notice of the Conference.

As the subject of National Education is of peculiar interest at the present time, and several topics of great importance to the Institutions are proposed for discussion at the Conference, the Council hope that each Institution and Local Board will not fail to appoint one or more Representatives to express its views.

Secretaries of Institutions are requested to forward *at once* by book post, copies of the last Annual Reports of their Institutions.

ARTIZANS' VISITS TO PARIS.

The Council of the Society of Arts, feeling the importance of promoting the intelligent study of the Paris Exhibition and the manufacturing establishments in France by artisans of the United Kingdom, have appointed a Committee in furtherance of this object, and on their recommendation, have passed the following minute :—

At the last and former International Exhibitions held in this country, arrangements were made by the French Government, to facilitate the visits of skilled artizans, and interesting reports on the exhibitions were made by them to their government. Believing that such visits on the part of skilled workmen to these great international displays not only exercise a beneficial influence upon the men themselves, but also upon the progress of industry in the country to which they belong, the Council of the Society of Arts have resolved to raise a fund to be employed, in aiding a limited number of English workmen to proceed to Paris for the purpose of studying the present French Exhibition.

To carry this object into effect, they have agreed on the following plan :—

1st. That a number of selected workmen (the number to depend on the amount of funds at the disposal of the Council) shall be assisted to proceed to and remain in Paris a sufficient time (say three weeks), for the purpose of making a careful study of the exhibition, and of such factories and workshops as they may desire to visit.

2nd. That every man so assisted shall, on his return, make a report to the Society of what he has observed during his stay, in reference to the special industry in

which he is engaged, and that it be made a condition of the grant to each man that one-third of the amount be retained until his report shall be supplied to the Society.

3rd. The Council think it will be undesirable to fix the exact time for, or to prescribe the duration of, these visits, or to interfere with any of the arrangements the men may desire to make for their own accommodation; but, in order that they may take advantage of the facilities provided by the Commission organised by the French Government for the study of the exhibition, the men will be placed in communication with that Commission on their arrival in Paris.

4th. A considerable sum will be required satisfactorily to accomplish the important object undertaken by the Society, and, in order to raise these funds, the Council have determined to appeal to the members of the Society, who must be interested in the successful results of this movement, in the belief that they will not hesitate to join in a subscription for the furtherance of the undertaking; and they propose at the same time to communicate with the various Chambers of Commerce, inviting their counsel and support. The Council have decided to commence the subscription by a vote of one hundred guineas from the funds of the Society.

Members are invited to aid the Council in this undertaking by subscriptions, which should be forwarded to the Financial Officer at the Society's house.

The following is the list of subscriptions up to the present date :—

H.R.H. the Prince of Wales, President	£31	10	0
Society of Arts	105	0	0
Earl Granville, K.G.	5	0	0
Lord de L'Isle	10	0	0
Thomas Twining	2	2	0
Sir J. P. Boileau, Bart.	5	0	0
George Godwin, F.R.S.	1	1	0
Vice-Chancellor Sir W. Page Wood, F.R.S.	10	0	0
W. H. Bodkin (Assistant-Judge)	3	3	0
Sir Rowland Hill, K.C.B.	3	3	0
Benjamin Shaw	2	2	0
Alfred Davis	10	10	0
Eugène Rimmel	5	5	0
Frederick Mocatta	2	2	0
James Marshall	2	2	0
Robert Dawbarn	1	0	0
Henry Vaughan	10	10	0
Philip Sancton	5	0	0
Somerset A. Beaumont	5	0	0
G. Dixon, Mayor of Birmingham	5	5	0
Messrs. Smith and Wright, Birmingham	5	5	0
Messrs. Griffiths and Browett, Birmingham	5	5	0
Henry Weiss, Birmingham	2	2	0
W. H. M. Blews, Birmingham	2	2	0
W. Middlemore, J.P., Birmingham	5	5	0
Thomas Lloyd, Birmingham	2	2	0
Messrs. Elkington and Mason, Birmingham	5	5	0
Messrs. John Hardman and Co., Birmingham	2	2	0
Messrs. J. and C. Osler, Birmingham	5	5	0
The Proprietors of the *Birmingham Journal and Daily Post*	2	2	0
The Proprietors of the *Birmingham Gazette*	2	2	0

A circular has been issued by the Birmingham Chamber of Commerce, "earnestly asking for the co-operation of manufacturers and others, believing it to be of the highest importance that the opportunity now afforded, by which the workmen of our town may be made acquainted with the productions of continental manufacturers, should not be lost," and inviting subscriptions.

Prizes for Art-Workmen.*.

The Council of the Society of Arts hereby offer Prizes for Art-Workmanship, according to the following conditions :—

I. The works to be executed will be the property of the producers, but will be retained for exhibition, in London and elsewhere, for such length of time as the Council may think desirable.

II. The exhibitors are required to state in each case the price at which their works may be sold, or, if sold previously to exhibition, at what price they would be willing to produce a copy.

III. The awards in each class will be made, and the sums specified in each class will be paid, provided the works be considered of sufficient merit to deserve the payment; and, further, in cases of extraordinary merit additional awards will be given, accompanied with the medal of the Society.

IV. Before the award of prizes is confirmed, the candidates must be prepared to execute some piece of work sufficient to satisfy the Council of their competency.

V. *Bona-fide* Art-workmen only can receive prizes.

VI. Although great care will be taken of articles sent for exhibition, the Council will not be responsible for any accident or damage of any kind occurring at any time.

VII. Prices may be attached to articles exhibited and sales made, and no charge will be made in respect of any such sales.

VIII. All the prizes are open to male and female competitors, and in addition, as regards Painting on Porcelain, Cameo-cutting, Engraving on Glass, Decorative Painting, and Wall Mosaics, a second set of prizes, of the same amounts, will be awarded among female competitors. If a female desire to compete in the female class only, she must declare her intention accordingly. The originals of the works prescribed may be seen at the South Kensington Museum.

IX. Any producer will be at liberty to exhibit, either in his own name or through his workmen, any work or works as specimens of good workmanship, in the various classes, provided that the work or works be accompanied with a statement of the name or names of the artizans who executed their respective portions; and if the work or works be sufficiently meritorious, extra prizes will be given to the artizans who have executed them.

X. Artizans may, if they think fit, exhibit works executed by them after other designs than those stated above, in any of the classes. Such works may contain the whole or portions of the prescribed designs, and must be of a similar style and character. Competitors must specify the class in which they exhibit. If the works be sufficiently meritorious extra prizes will be awarded.

XI. All articles for competition must be sent in to the Society's house on or before Saturday, the 21st of December, 1867, and must be delivered free of all charges. Each work sent in competition for a Prize must be marked with the Art-workman's name, or, if preferred, with a cypher, accompanied by a sealed envelope giving the name and address of the Art-workman. With the articles, a description for insertion in the catalogue should be sent. The works will be exhibited at the Society's House, and afterwards at the South Kensington Museum.

Casts may be seen at the Society of Arts, Adelphi, London, and the Schools of Art at Edinburgh, Dublin, Manchester, Glasgow, Birmingham, and Hanley in the Potteries.

* The Worshipful Company of Salters contribute £10 annually to this prize fund. The Worshipful Company of Goldsmiths contribute £15 "for the encouragement of workmen in the precious metals." Particulars of the Goldsmith's Company's prizes are given. The North London Exhibition Prize consists of the interest of £167 7s. 3d., invested in the name of the Society of Arts, to be awarded by the Council "for the best specimens of skilled workmanship" at the Society's Exhibition of the works sent in for the prizes named above.

Photographs and rough casts in metal, &c., may be purchased at the Society of Arts, John-street, Adelphi, at the prices named.

The plaster casts of the examples in classes 2 and 4 (except bas-relief 4*a*) may be obtained from Mr. Franchi, 15, Myddelton-street, Clerkenwell, E.C.; the other casts from Mr. D. Brucciani, Galleria delle Arti, 40, Russell-street, Covent-garden, W.C.

*** The Council are happy to announce that several of the works which received first prizes in the competitions of 1863, 1864, 1865, 1866, and 1867, have been purchased by the Department of Science and Art, to be exhibited in the South Kensington Museum and the Art Schools in the United Kingdom.

FIRST DIVISION.

Works to be Executed from Prescribed Designs.

For the successful rendering of the undermentioned designs in the various modes of workmanship according to the directions given in each case.

Class 1.—Carving in Marble, Stone, or Wood.

(*a.*) *The Human Figure.*—One prize of £15 for the best, and a second prize of £7 10s. for the next best, work executed in marble or stone, after part of a frieze of a chimney-piece, by *Donatello*, No. 5,795, in the South Kensington Museum; or a relievo in terra cotta, Amorini supporting an entablature; original in the South Kensington Museum, No. 11,940. Dimensions—Two-thirds the size of the cast (linear).—The design may be adhered to strictly or adapted to any architectural purpose.

[Cast—Fifteen Shillings; Photograph—One Shilling.]

(*b.*) *Ornament.*—One prize of £10 for the best, and a second prize of £5 for the next best work, executed in marble, stone, or wood after a carved chair-back in the South Kensington Museum. Dimensions—To be two-thirds of the cast (linear).

[Cast—Twelve Shillings. Photograph—One Shilling.]

(*c.*) *Ornament.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed in stone, after a *Gothic bracket* in the Architectural Museum. Dimensions the same as the cast. In this design the details may be improved by the introduction of small animals, and the human head may be changed according to the taste of the art-workman.

[Cast—Ten Shillings; Photograph—One Shilling.]

(*d.*)—One prize of £20 for the best, and a second prize of £10 for the next best, work carved in *wood* after a panel in carved oak. Original in South Kensington Museum, No. 274. Dimensions—Optional.

[Photograph—Sixpence.]

(*e.*)—One prize of £15 for the best, and a second prize of £7 10s. for the next best, work carved in *wood* after the entablature of a chimney-piece carved in wood, in the South Kensington Museum, No. 85.'64. Dimensions—Same size as original.

[Photograph—One Shilling.]

(*f.*) *Ornament.*—One prize of £10 for the best, and a second prize of £5 for the next best, work carved in wood after an *Italian picture frame* in the possession of Henry Vaughan, Esq. Dimensions optional.—This design may be adhered to strictly or adapted in such manner as the workman may think fit.

[Photograph—Two Shillings.]

(*g.*) *Ornament carved and gilt.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed in wood, carved and gilt after a *Console Table* in the South Kensington Museum, No. 6,497, of the period of Louis XVI. The work to be carved roughly in wood, then to be prepared in the white by a gilder, then cut up or carved in the white by the carver, then to be gilt in mat and burnished gold. As such work may probably be executed by two persons, the prize will be apportioned as the judges may determine.

[Photograph—One Shilling.]

Class 2.—Repoussé Work in any Metal.

(*a.*) *The Human Figure as a bas-relief.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after the Martelli Bronze Mirror Case, No. 8,717, in the South Kensington Museum—dimensions, 6¾ inches diameter; or a panel in low relief, the Virgin and Child, in South Kensington Museum, No. 66.'66. Dimensions—One-third of original.

[Cast of Mirror Case—Two Shillings; Photograph—One Shilling. Cast of Bas-relief, 3s. 6d.

(*b.*) *Ornament.*—One prize of £5 for the best, and a second prize of £3 for the next best, work executed after a tazza in silver, date 1683, the property of Sir W. C. Trevelyan, Bart., now in the South Kensington Museum. Dimensions—The same as the model.

[Photograph—One Shilling.]

Class 3.—Hammered Work, in Iron, Brass, or Copper.

Ornament.—One prize of £7 10s. for the best, and a second prize of £5 for the next best, work executed after a knocker in wrought iron, in the South Kensington Museum, No. 9,007.

If the work is executed in brass or copper, it should be rendered subject to the conditions of these metals, either as split and riveted or partly beaten from the sheet, and the awards will be made in view of these conditions. The work must not be covered with colour or any coating which masks the workmanship.

[Photograph—One Shilling and Threepence.]

Class 4.—Carving in Ivory.

(*a.*) *Human Figure in the round.*—One prize of £15 for the best, and a second prize of £10 for the next best, work executed after an ivory plaque of Silenus and Amorini, by *Fiamingo*, No. 1,059, in the South Kensington Museum; dimensions—five inches greatest length; or after a relievo in marble, the Virgin and Child, No. 4,233 in the South Kensington Museum. Dimensions—To be reduced in height by one-third (linear).

[Cast of the Plaque—Two Shillings; and Photograph of the Virgin and Child—One Shilling each.]

(*b.*) *Ornament.*—One prize of £7 10s. for the best, and a second prize of £5 for the next best, work executed after an ivory crozier head, in the South Kensington Museum, No. 214.'65. Dimensions—The same as the cast.

[Cast—One Shilling.]

Class 5.—Chasing in Bronze.

(*a.*) *The Human Figure.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a panel in low relief, the Virgin and Child, in the South Kensington Museum, No. 66'66.

A rough casting in bronze, on which the chasing must be executed, will be supplied by the Society at cost price.

[Plaster Cast—Three Shillings and Sixpence.]

(*b.*) *Ornament.*—One prize of £10 for the best, and a

second prize of £7 10s. for the next best, work executed after a silver gilt missal cover, in the South Kensington Museum, No. 2,639.

[Photograph—One Shilling.]

CLASS 6.—ETCHING AND ENGRAVING ON METAL—NIELLO WORK.

Prizes of the Goldsmiths' Company.

Ornament.—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after arabesques by Lucas Van Leyden, A.D. 1528. No. 18,968 in the South Kensington Museum. To be engraved the height of the photograph, and, if round a cup or goblet, repeated so as to be not less than nine inches in length when stretched out.

[Photograph—Sixpence.]

CLASS 7.—ENAMEL PAINTING ON COPPER OR GOLD.

(*a.*) *The Human Figure.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a panel in low relief, the Virgin and Child, in the South Kensington Museum, No. 66.'66. Ground to be blue. Dimensions—Half size of original.

[Photograph—One Shilling; Cast, Three Shillings and Sixpence.]

(*b.*) *Ornament.*—One prize of £5 for the best, and a second prize of £3 for the next best, work executed after the back of a plate, No. 8,428, in the South Kensington Museum. Ground to be blue. Dimensions—The same as the Photograph.

[Photograph—Sixpence.]

CLASS 8.—PAINTING ON PORCELAIN.

(*a.*) *The Human Figure.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a photograph of a drawing by *Raphael*, No. 20 in the South Kensington Museum. Dimensions—The same as the Photograph. This work is to be coloured according to the taste of the painter.

[Photograph—Ninepence.]

(*b.*) *Ornament.*—One prize of £5 for the best, and a second prize of £3 for the next best, work executed after a photograph of ornament by *Aldegrever*, No. 2,118 in the South Kensington Museum, and coloured according to the taste of the painter, with a gold ground. Dimensions—Double the size of the Photograph (linear).

[Photograph—Sixpence.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

CLASS 9.—DECORATIVE PAINTING.

(*a.*) *Ornament.*—One prize of £5, and a second prize of £3, for a work, executed after a photograph of ornament by *Aldegrever*, in the South Kensington Museum, No. 2,118. Dimensions—length, 3 feet.

[Photograph—One Shilling.]

(*b.*) *Ornament.*—One prize of £5, and a second prize of £3, for a work, executed after a *picture frame*, in the South Kensington Museum, No. 7,820. Dimensions—5 feet by 3 feet 11½ inches, outside measure. The works to be executed on canvass, either with or without stretchers, in cool colours. Some lines of the mouldings may be gilt.

[Photograph—One Shilling and Sixpence.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

CLASS 10.—INLAYS IN WOOD (MARQUETRY, OR BUHL), IVORY OR METAL.

Ornament.—One prize of £5 for the best, and a second prize of £3 for the next best, work executed after a guitar inlaid with ivory, ebony, and mother-o'-pearl. The ornament to be of the same dimensions as the original, but may be applied to any object. No. 9,611 in the South Kensington Museum.

[Photograph—Sixpence.]

CLASS 11.—CAMEO CUTTING.

(*a.*) *Human Head.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a bust of *Clytie* in the British Museum—The head only.

[Cast of the Head—Five Shillings.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

CLASS 12.—ENGRAVING ON GLASS.

Ornament.—One prize of £10 for the best, and a second prize of £3 for the next best, work executed after arabesques by Lucas Van Leyden, A.D. 1528. No. 18,968 in the South Kensington Museum. To be engraved the height of the engraving; and if round a glass or goblet, repeated so as not to be less than 9 inches long when stretched out.

[Photograph—Sixpence.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

CLASS 13.—WALL MOSAICS.

Human Head.—One prize of £10 for the best, and a second prize of £7 10s. for the next best, work executed after a *Female Head* (over the lame cripple) in the cartoon of the "Beautiful Gate." The dimensions of the work should be regulated by the size of the tesseræ proposed to be used, which size may be left to the choice of the artist. Although desirable, it is not necessary to execute the whole subject in actual mosaic. The original is at the South Kensington Museum. Tesseræ of two sizes may be obtained from Messrs. Minton, Stoke-upon-Trent, Messrs. Maw and Co., Brosely, Shropshire, Messrs. Powell and Sons, Temple-street, Whitefriars, and Messrs. Jesse Rust and Co., Carlisle-street, Lambeth.

[Photograph—One Shilling.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

CLASS 14.—GEM ENGRAVING.

(*a.*) *Human Head.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a cameo portrait of Savonarola, No. 7,541 in the South Kensington Museum. Dimensions—The same as the cast.

[Cast—Sixpence.]

(*b.*) *Full-length Figure.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a small Wedgwood medallion, No. 5,827 in the South Kensington Museum. Dimensions—The same as the cast.

[Cast—Sixpence.]

CLASS 15.—DIE SINKING.

Human Head.—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after

a Wedgwood Medallion in the South Kensington Museum, No, 3,470. Dimensions—

[Photograph—Sixpence.]

Class 16.—Glass Blowing.

Ornament.—One prize of £7 10s. for the best, and a second prize of £5 for the next best, work executed after an original in the South Kensington Museum, No. 6,785. Dimensions—As given in the wood engraving.

[Photograph—Sixpence.]

Class 17.—Bookbinding.

(*a.*) *Bookbinding.*—One prize of £7 10s. for the best and a second prize of £5 for the next best, work executed in bookbinding, after a specimen in the South Kensington Museum, No. 16,460. The work to be bound should be some classical author of the size given. Dimensions—The same as the photograph.

[Photograph—One Shilling.]

Class 18.—Embroidery.

Ornament.—One prize of £5 for the best, and a second prize of £3 for the next best, work executed, either after *Two Angels* in an example in the South Kensington Museum, No. 1194.'64, or an Italian Silk in the South Kensington Museum, No. 7,468, which may be adapted to a screen. Dimensions—According to the taste of the embroiderer.

[Photograph—German, Sixpence; Italian, One Shilling.]

Class 19.—Illuminations.

Ornament.—One prize of £5 for the best, and a second prize of £3 for the next best, copy made from an Altar Card, attributed to Giulio Clovio, in the South Kensington Museum, No. 2,958, or from a MS. border, date 1450, No. 3,057, in the South Kensington Museum. Dimensions—One-half larger than the Photograph (linear).

[Photograph—Two Shillings.]

SECOND DIVISION.

Class 20.—Wood Carving.

(*a.*) *Human figure in the round, in alto or in bas relief. Animals or natural foliage may be used as accessories.* 1st prize of £25 and the Society's Silver Medal. 2nd prize of £15. 3rd prize of £10.

(*b.*) *Animal or still-life. Fruit, flowers, or natural foliage may be used as accessories.* 1st prize of £10. 2nd prize of £7 10s. 3rd prize of £5.

(*c.*) *Natural foliage, fruit, or flowers, or conventional ornament, in which grotesque figures or animals may form accessories, preference being given where the work is of an applied character for ordinary decorative purposes, as representing commercial value.* 1st prize of £10. 2nd prize of £7 10s. 3rd prize of £5.

(By Order)

P. LE NEVE FOSTER,
Secretary.

April, 1867.

Subscriptions.

The Lady-day subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Examinations, 1867.

The following additions should be made to the List of Certificates awarded to Candidates which was given in the *Journal* of the week before last:—

1192—Burrell, James S., 18, Oldbury Local Board, railway carriage finisher—Arith. (1st)
1189—Edwards, Joseph J., 18, New Swindon M.I., clerk—Bkpg. (3d)
1187—Lancett, John, 18, New Swindon M.I., engine-fitter—Arith. (3d)
1188—Stone, Samuel, 22, New Swindon M.I., joiner——Bkpg. (3d)
1186—Thomson, Mary S., New Swindon M.I., milliner and dressmaker—Dom. Econ. (1st)
1190—Webb, George, 27, Oldbury Local Board, coach-maker—Arith. (3d)
1191—Whyman, John, 20, Oldbury Local Board, wagon builder—Arith (3d).

The Second Prize in Geometry has been awarded to No. 127, Daniel Welwood, 17, Belfast Science School, clerk.

Proceedings of the Society.

Food Committee.

A meeting of the Sub-Committee on Fish was held on Tuesday, 14th May:—Present, Mr. Benjamin Shaw in the chair; Mr. Caird, Mr. Ware, Mr. Michael, Professor J. Wilson, Captain Grant, and Mr. Ludford White.

Mr. George W. Hart, Superintendent of the Hayling Oyster Fishery, attended on the invitation of the Committee, and laid on the table plans of the breeding and feeding ponds belonging to that company at Hayling island; also of Chichester harbour, where a portion of the foreshore had recently been acquired by the same company in order to extend their operations in oyster culture, and handed in the following statement:—

Oyster Culture in 1866-67.

It is difficult, in treating of this subject, to avoid referring to previous results obtained abroad, inasmuch as prior to June last nothing whatever had been accomplished in England in furtherance of this branch of pisciculture.

The cultivation of oysters abroad has been in three distinct and different methods, as required by as many varied local conditions.

The ancient Lake Fusaro is an example of the enclosure system; the Isle de Rhé shows us how to utilise our foreshores; and the experiments of M. Coste, at St. Brieux indicate that much may be done for the improvement of the oyster grounds in the deeper waters of the open channel.

The Lake Fusaro plan possesses many advantages over the other two, and has but one drawback—it is costly, and requires the outlay of a large capital for three years before any return is obtained; but it is undoubtedly the most certain and remunerative in the end. The successful experiments of last summer having been conducted on this plan, I shall have but little to say on the other two.

A reference to the map of England will at once show that there are on our coasts few places so well adapted for fish farming as the portion lying between Selsea-bill and Weymouth, comprising the harbours of Chichester, Emsworth, Langston, Portsmouth, Southampton, and Poole, with many other smaller inlets, and presenting at ebb tide immense expanses of mud of the very best kind for growing oysters and other molluscs.

These grounds are denuded of oysters, from the absence of any regulations or protective laws, although not many years since they abounded in natives not greatly inferior to the Whitstable or Colchester kinds.

Owing to the absence of spat, and the consequent scarcity of brood on the Essex and Kentish shores, it has of late been remunerative to companies established there to dredge in localities much more distant than those they formerly resorted to, and it is to be noted that whereas the dredgermen of the harbours above-named, although not under any regulations, of their own will abstained from the removal of spat and cultch, and returned, when caught, all oysters under two inches diater, yet the dredgers from Whitstable and Colchester, not content with a fair share, have carried away not only brood but also every stone procurable with spat on it, and but little of the spat so obtained has been old enough for removal, and consequently died, thus causing incalculable damage, and, in fact, destruction to an important fishery here without benefiting the public in any degree, the plea speciously advanced, that although the local industry of the fishermen here was destroyed yet that the general public has been benefited by the transfer of the brood so obtained to Whitstable or Colchester, being shallow in the extreme and not borne out by the result. The consequence is that oyster-dredging in the harbours named no longer affords a living, whereas formerly the boats engaged in it were to be counted by hundreds. This being the condition of the local fisheries at the period when my attention was first directed to the subject, learning that success had attended the efforts of M. Coste to revive the French oyster fisheries, in the course of the summer of 1865 I visited the coast of France from St. Brieux to Rochelle, in order to examine and judge for myself how far his system might be applicable to our English shores.

At St. Brieux and Cancale the oyster beds were in deep water, and the cultivation was carried on by dredging, as at Whitstable, but the beds being over-worked and damaged by N.W. gales, which set in there with great violence, had become buried in the sand, and abandoned, because the few oysters remaining were insufficient to repay the labour of keeping them clean. M. Coste was unfortunate in selecting this exposed part of the coast, inasmuch as although his experiments there resulted in a wonderful success (the fascines which he had sunk over the beds averaging some 20,000 oysters each), yet the returning winter gales drove the fascines from their moorings, and once more destroyed both the brood and the parent oysters.

The system of oyster culture as pursued at the Isle de Rhé, was established nearly simultaneously with, but quite independently of, M. Coste's experiments in the Bay of St. Brieux, and was a better adaptation of means to the requirements of the locality.

The shores of this island are exposed to severe gales and heavy seas from the Bay of Biscay. M. Bœuf therefore wisely abstained from the use of fascines, and contented himself with simply providing a better arrangement of such collecting materials as were at hand, and sheltering the young from the destructive heat of the sun. This he effected by forming a series of half-tide ponds with the rocks which there strew the coast, and placing the breeding oysters under rows of these stones in the ponds so formed. Dr. Kemmerer substitutes tiles for stones, but this is the only difference.

At Arcachon the tiles yield good annual returns, but at Poole, where they were tried last summer, under the management of a French gentlemen from Arcachon, the result was *nil*, and previous experiments at Southend and Herne Bay were equally unfavourable.

I thought it evident that a control of the temperature was essential to any plan for making the spat, and nearly every person engaged in the oyster trade agreed in this opinion. I determined, therefore, upon carrying out the Fusaro plan at Hayling, where I obtained on lease 900 acres of suitable mudlands, a portion of which was already bounded by a railway bank, carried across the mud for the purpose of reclamation; this ground I subsequently turned over to the South of England Oyster Company (Limited), and, acting as their manager, I have this year 30 acres under cultivation, and have laid down therein about 1,000,000 of breeding oysters, and 20,000 hurdles, having a total collecting surface of 400,000 square feet, or nearly 10 acres.

As there was necessarily some delay in enclosing this area, I also secured, in March, 1866, the old Saltern works, on the east side of Hayling Island, consisting of an enclosure of six acres and a pond of four acres. This pond having been laid dry, to admit of the weed being removed, it was to the extent of one acre covered with sand and shingle, in layers, and upon the hard bottom thus obtained some 50,000 oysters were placed in the month of April, 1866, together with about 80 hurdles, of 15 square ft. each, placed over them horizontally, and secured by stakes.

On the 15th June a considerable fall of spat took place, although it was not until July that any oysters were found attached to the hurdles. On the 15th July the hurdles were found to be literally covered on the underside with oysterlings, the general size at that time being about $\frac{1}{10}$ inch diameter. On being removed subsequently to another part of the grounds for growing I had the numbers adhering to three hurdles ascertained, and this gave an average of 10,400 per hurdle, being at the rate of 600 per square foot of surface. Besides this satisfactory result, the shingle is everywhere covered with spat, as are also the rushes and banks of the pond; and I have no doubt whatever but that, had the entire surface of the pond been prepared with hurdles, they would have been equally well filled as the 80 laid down. The market value of the whole crop was estimated by an oyster merchant as being, at least, worth £2,000 when grown to a saleable size. These oysters have not suffered in the least from the late winter, and are now growing rapidly.

I shall this year also construct collectors for the spat on the Isle de Rhé system, but I think it cannot be relied upon for an annual crop, although in favourable seasons it adds greatly to the productives of the shores. In fact, it affords simply places of attachment to the floating spat, the greater portion of which would otherwise fall on unsuitable ground and therefore perish; but where natural beds exist at no great distance from the shore I am of opinion that the Isle de Rhé system will be valuable, provided the materials for the beds be at hand and obtainable at a moderate price.

I tried last year the system of fascines sunk in the Spithead Channel, but in the heavy gales they suffered the fate of those at St. Brieux.

That oyster farms on the plan of the South of England Oyster Company are beneficial to the population of the adjoining coast cannot be doubted, as at present the outlay in wages exceeds £2,000 annually, and when fully established will approximate £10,000.

There is at the present time great need of a fishery board, for the regulation of the coast fisheries. Many regulations of the Board of Trade are, in my opinion, inefficient and in many respects injurious.

The South of England Oyster Company have fitted up apparatus for hatching salt-water fish, but up to the present time I have not succeeded in obtaining fertilised ova. In a portion of their grounds, however, I bred last summer several thousands of lobsters, and I believe that this is also a branch of ocean farming which is deserving of attention.

In reply to questions by members of the Committee,

Mr. Hart stated it was found necessary to enclose the whole of the breeding ponds. A bank was carried along about four feet above the water line, which was obliged to be made strong to withstand the heavy seas. There was a great difference between the temperature of the

water inside and outside the ponds—as much as from 4° to 6° every day. The average temperature at that time was about 72°. Temperature had an essential effect upon the oysters, both in breeding and growing. The late very severe weather did not affect the oysters so as to kill them; but the old oysters were more delicate than the young ones in this respect. He called oysters of 10 or 12 years of age old oysters, and he had them about that size for breeding. He had a Colchester native which he should say was 30 years old. The great thickness of the shell was a test of the age; but beyond a certain period there were no certain rules to go by. To a certain extent the age could be known by counting the number of rings on the upper shell. Equability of temperature was most desirable, and to obtain that there must be a body of water not less than two to three feet deep. He liked the rays of the sun to penetrate to the bottom of the ground. The bottom of the water was much warmer than the top, as he had frequently tested in going over the grounds in a boat, the difference of temperature being quite perceptible to the hand; and in a distance of a few yards there might be a difference of temperature, according to the nature of the bottom, or according as it is more or less sheltered from the wind. He took observations with the thermometer sometimes six times a day, and he almost invariably found the bottom portion of the water warmer than the top, which might to some extent be occasioned by the chilly effect of rapid evaporation. It was also the case in deep sea that the temperature of the bottom was higher than the top. He had comparative tables of the heat of the atmosphere and that of the water in the parcs, but he had not got them with him. Mr. Hart handed in the following record of readings from the thermometer in sea water in parcs 18 inches deep, from 15th June to 4th July, 1866, inclusive:—

Day.		Night.			
Max.	Min.	Max.	Min.		
60	52	58	54	15th June	Dull.
58	50	56	48	17th June	Cloudy.
56	48	52	50	18th June	Rainy.
60	52	60	52	19th June	Cloudy.
60	54	60	54	20th June	Hazy.
70	58	68	60	21st June	Clear.
70	62	70	58	22nd June	Clear.
70	62	70	60	23rd June	Clear.
70	62	68	60	24th June	Clear.
70	62	70	62	25th June	Clear.
74	64	70	62	26th June	Clear.
72	64	70	64	27th June	Thunder and heavy storm.
75	64	74	62	28th June	Thunderstorm.
76	63	74	64	29th June	Hazy.
73	54	63	50	2nd July	Overcast.
60	54	58	52	3rd July	Overcast.
60	50	59	50	4th July	Squally.

The average for the last fortnight in June being:—

For the day time..... Max. 67 ... Min. 58 ... Mean 62½
For the night ..... Max. 65½ ... Min. 57½ ... Mean 61½

In continuation, Mr. Hart stated that the temperature of the water within the parcs was from 4° to 6° warmer than that of the external sea. On our shores there was but one species of the oyster; the difference between natives and the large coarse oyster consisting merely in the ground on which they were deposited, and their subsequent treatment. Oysters deposited on the mud would not become large like the Channel oysters; but if the natives were deposited in the channel they would become so. In some localities oysters make more rapid growth than in others; for instance, in places where there is a great deal of material to enable the oyster to make shell rapidly it will grow to a great size; whereas, if put on muddy ground, and supplied with plenty of food, and but little shell-forming material, they become fat and lazy, and they do not care to make their house larger; but on poor feeding grounds they seem to run to shell a great deal. It depends upon the supply of food. An oyster brought from the deep-sea and placed on good feeding-ground, though it does not alter in appearance, becomes a well-fed oyster. The plan at Hayling is not to feed but to breed the oysters; to establish great breeding beds, from which it is expected a supply may be found for the feeding beds of the country. The Whitstable, the Herne Bay, and other feeding companies, we expect, will be our principal customers for young oysters, and not as competing with us. The position at Hayling, from the peculiarity of the water, is very well adapted for the production of oyster brood, especially for early brood. The facilities for forming embankments for laying down breeding oysters are also great. There is such an extent of ground there for breeding oysters as would enable us to stock to a large extent the best feeding grounds in this country?

Professor Wilson—Are you acquainted with Poole harbour?—Yes.

I should think that was a good position, because there are hundreds of acres of mud-banks?—It is not enclosed, and you cannot do that unless you close one of the two channels. At Hayling, at Chichester, and at Langston, we have complete facilities for enclosing the grounds. The feeding grounds at the mouth of the Thames are said to owe their special value to the amount of London sewage deposited there.

Mr. Caird—With regard to the Fusaro plan, where had it its origin?

Mr. Hart—At Fusaro, the old Avernus, a little distance from Naples. It was used as an oyster pond formerly, and has been so since. The plan adopted there is that of piling up stones on the muddy bottom, which is very offensive black-looking mud, and when stirred up the stench is unbearable. Stones are placed upon the mud, and the oysters upon the stones. Piles are driven round the ponds and fascines are hung upon them by strings suspended vertically. The lake communicates with the sea by means of a small canal. The tide at Fusaro is very little, and the canal is about two miles long. I am not aware what is the depth of water in the pond. The temperature would probably be higher than anything ever occurring at Hayling. By means of an enclosure from the sea, and the power of admitting the tide when thought proper, we can to a great extent in summer time govern the temperature of the breeding-beds, and this is most essential.

Do you suppose, generally speaking, on the coast of England the temperature is sufficient for the production of the spat?—I cannot say what the temperature is, but I think so.

The difference between your system and the natural process is this—that in the open sea, the temperature is not very high, and the tides flowing out and in daily, renders it impossible to regulate the temperature, so that the spat either may not be produced, or may be lost when produced?—That is one of the things; but the spat goes backwards and forwards with the tide. But in our ponds we can regulate the temperature to a great extent, and to a great extent control it during the spatting season. A succession of cold nights would be injurious to us. Last summer the temperature was not lower than 62½° in the middle of the day and 61½° at night, and this continued for fourteen days together, and that was at the time when the spat was coming on. There was no spat in Chichester Harbour last year, except in our beds. By regulating the temperature we insured spat, while there was no natural spat outside. In a good season the spat is produced in such enormous quantity that, if preserved, it would be sufficient to stock the feeding-beds of the country for six or seven years in succession, but after many years, when there has been a want of spat the beds become dirty, because it does not pay to dredge, and when the spat comes the ground is in a bad state for it, and the spat is sacrificed. Last year the first experiment was tried. We had about four acres of ponds, and about one acre of shore for laying oyster

ova. We had eighty hurdles, and 50,000 breeding oysters. The success of last year was so decided that we have greatly extended our operations this year. We shall have 10 acres of collectors instead of 1,200 feet; and 20 acres of shingle instead of one; and a million of oysters instead of 50,000. Our supply is dredged off the French coast, from ground which it was open for nation to fish upon.

After you have completely established, should you be so fortunate as to do so, breeding beds of this kind, it is not necessary to recruit the ground at the same rate that you have been doing; the mother oysters will continue to breed?—I should myself prefer to change the breeding stock every year.

What would you do with those which have bred?—Send them to the London market. We can fatten them equal to the Shorehams, but not so as to be comparable with the natives. The Shorehams are deep-sea oysters, and are laid upon shore beds to fatten.

You would not keep the brood oysters after one season?—No; they get poor in winter.

When would they be ready for the market?—Before Christmas the same year, but they would have to be sent to other beds for the purpose.

Then you prepare ground for a new stock of mother oysters from the deep sea?—Yes, every year. We find that the change of ground is most beneficial to the oysters, and it is that which constitutes the Whitstable working. They dredge the oysters from one bed and shift them to another piece, though it may not be far off. It is that which gives the oysters their good flavour, and causes them to fatten so rapidly. I fancy the reason why our spawn comes so early is that we bring the oysters out of deep water and put them in shallow.

Your plan involves a fresh supply of parent oysters from the deep sea every year of about $2\frac{1}{4}$ millions?—I think it is desirable to have them.

In your future operations you do not anticipate the necessity of entirely stocking the beds with breeding oysters from the deep sea?—No.

Have you formed any opinion as to whether the oyster is hermaphrodite, or male and female?—I believe both the sexual organs are present, but whether milt will fertilise the ova of the same animal I cannot say. I find in May nothing alive in the oyster but spermatozoa; but that both organs exist I am sure, because I find spermatozoa in every oyster, but not always ova. I think we may be able to select the oysters which are to be kept for brood, and send away another portion for feeding or breeding stock. I think as soon as the grounds are well filled there will always be sufficient left at the bottom of the ponds to keep up the spat. After the grounds are matured we do not think there will be much call by us upon the beds of the sea. The oyster commences to breed about two years old, and small oysters of that summer will be fit to send off to the feeding grounds by Christmas, but we shall probably keep them till next summer. They are sold at so much per bushel or tub. We buy the oysters from the deep sea beds by the bushel. We have been paying less this year than we did last. Last year we paid 7s., this year we paid only 6s. The oyster brood of last year will be fit for the London market in about two years.

The CHAIRMAN, reverting to the paper handed in by Mr. Hart, and read at the commencement of the sitting, said there was at the latter part of it reference made to a matter on which the Committee might be able to take some action. That was with respect to the regulation of the Board of Trade in relation to the coast oyster fisheries, on which Mr. Hart expressed himself that some alterations were required in the interests of those fisheries. They had listened to what Mr. Hart had stated to the Committee, but it did not indicate any course of action. If prejudicial regulations required to be removed, he apprehended that was something to which the Committee could practically turn their attention. He would, in the first instance, ask Mr. Hart in what way he conceived the regulations of the Board of Trade operated injuriously to the oyster fisheries of the country?

Mr. HART replied that at present dredging is permitted in the month of September, which, he said, was exceedingly wrong; and not only that, but they authorised dredging to be continued the whole summer through in English waters.

Mr. CAIRD said it was pressed upon the Fishery Commissioners the propriety of curtailing the time one month at the end of the season, and adding one month at the beginning. The reasons urged for this were two—first, that as the oysters did not generally begin to spawn till the month of May, it would be an immense advantage to the fishermen to go to the deep-sea to fish in quiet water. Then, again, it was stated that in the month of September the oysters had not recovered from spawning, and were out of condition; for those reasons the changes were made. It was no doubt highly objectionable that oysters should be taken at a time when they were out of condition; but the young brood would not be destroyed by dredging in September.

Mr. HART apprehended that dredging at that period could not be carried out without injury from the dredge to the young spat. With regard to the damage done by the Whitstable and Colchester fisherman being allowed to procure spat from anywhere they choose, he had something to say on that point when they came to it. He spoke in the interest of the local fishermen. The Whitstable people especially were greatly given to overdredging the beds to the extent of carrying off the spat and cultch, and wholly destroying the ground, and there was no power to prevent them doing this vast amount of injury to the deep-sea beds. The company with which he was connected, Mr. Hart added, had applied to the Board of Trade to give them a channel which was now used as a dredging ground, and they offered to stock the water inside the Isle of Wight, provided the Board of Trade would appoint a conservancy board to manage it. The company offered to provide the spat, and stock the ground for the benefit of the local fishermen; but of course the Whitstable people must be precluded from coming to dredge there. At the commencement of the season they came 50 or 60 sail strong and took away everything they could get, and left nothing to breed from. The local fishermen would, for their own sakes, work the ground properly and keep it well stocked. In reply to further questions, Mr. Hart stated that he had seen the green coloured oysters met with in France, which he considered to be the result of local circumstances. He said he could make oysters green in a fortnight; it was a mere matter of the ground on which they were placed.

Mr. CAIRD remarked that in the neighbourhood of Malden, in Essex, a peculiar green coloured oyster was produced, which for years past had been sent to the French markets.

Mr. HART stated that there had been a great quantity of the green weed, which grew immensely in the ponds under his superintendence, which at first affected the colour of the oysters, imparting a green colour to the beard; but as the weed in question was removed, the oysters became of a proper colour. Blanket weed was the local name given to the plant of which he spoke.

Mr. CAIRD remarked that a green coloured description of oyster was found in the shallow waters of the Mediteranean.

The following information has been received through the courtesy of Lord Stanley, Secretary of State for Foreign affairs:—

BELGIAN LAW AGAINST ADULTERATION OF FOOD.

Those who have adulterated, or caused to be adulterated, provisions, or drinks, or any kind of alimentary

substances, intended for sale, shall be punished by an imprisonment of from eight days to a year, and a fine of from 50 to 1,000 francs, or one of these penalties only.

The persons punishable under the preceding article are—1st. Those who sell, or expose for sale, provisions, drinks, or alimentary substances of any kind, knowing them to be adulterated. 2nd. Those who, by placards, written or printed, published, sold, or distributed, shall maliciously give instructions for facilitating or aiding in the adulteration of food and drinks.

Imprisonment from eight days to six months, or a fine from 26 to 500 francs, or one of these penalties only, is enacted against those who have in their warehouse, shop, or any other place, drinks, provisions, or alimentary substances, intended for sale, knowing them to be adulterated.

In certain cases, when the accused shall be condemned to an imprisonment of more than six months, he shall be deprived of his license, and will not be able to obtain another during the term of his imprisonment. The court can always direct that the judgment shall be posted in places where it orders, and inserted, either entire or in extract, in such newspapers as they may direct, at the expense of the convicted.

The provisions of the law will be applied without prejudice to heavier punishments given by the Code Pénal, or by special laws.

Those who shall, without criminal intent (provided for under the foregoing law), sell, or expose for sale, adulterated drinks, provisions, or alimentary substances, shall be punished according to articles 475 and 476 of the Code Pénal. In case of a fresh offence, the penalty of imprisonment for five days at most can be pronounced.

In fining, the court and tribunals can order that, in default of payment after two months from the date of the judgment, whether after a hearing, or notice, or by default, this fine may be changed into imprisonment, not exceeding the term of a year, in the cases above provided for, or by a simple police imprisonment, not exceeding the term of seven days, in cases named in the preceding article. The condemned can be always released on paying the fine.

With regard to the condemnation in costs pronounced for the benefit of the state, the duration of imprisonment shall be fixed by the judgment or decree, which cannot be less than eight days, nor more than one year or one month, according to the nature of the offence. Nevertheless the convicted, who can prove their insolvency according to the Criminal Code, can be liberated after having undergone seven days' imprisonment, when the expenses shall not exceed 25 francs. Imprisonment is not carried out against those convicts who have attained their 70th year.

Adulterated provisions, drinks, or alimentary substances which are found in the possession of the culprit shall be seized and confiscated. If they can be used for food, they shall be handed over to the charitable institutions of the Commune where the crime has been committed. If not they must be destroyed.

The penalties can be applied cumulatively or separately.

When any extenuating circumstances exist in favour of the accused, the penalty of imprisonment and fine pronounced under the present law can be reduced respectively below 8 days, or below 26 francs, without their being simple police cases.

Regulations for the Sale of Butter in the City of Brussels.

Two experts are appointed for the examination of butter destined for sale or the consumption of the inhabitants. These experts are named by the Conseil Communal; they enter on their duties after having taken an oath to fulfil them faithfully.

The local police, accompanied by the experts, make frequent visits to the markets, and to the dealers in all public places where this commodity is sold. Butter for sale cannot be withheld from being inspected by the experts.

Butter supposed to be adulterated shall be provisionally seized, and submitted to an analysis by the city chemist. His report, combined with that of the experts, shall be transmitted, within three days from the date of the seizure, to the chief Commissioner of Police, who shall institute, if there be reason, the prosecution authorised by law.

At the wholesale market, butter can neither be sold nor exposed for sale, if it has not been previously submitted to the examination of the experts. Butter of the first quality will be, if required by the dealer, stamped by the expert with a wooden stamp, adopted by the Burgomaster and Aldermen.

Butter at the wholesale market is divided into three qualities, the first of which comprehends butter of the best quality stamped; the second, every kind of butter not mixed and not stamped. Butter described as mixed butter forms the third quality; a special mark is affixed to this butter.

Dealers are forbidden to assume at the wholesale market any other quality than that assigned them by the experts; they may neither alter nor efface the marks indicating the quality of butter before they deliver at the houses of their customers.

The Burgomaster and Aldermen shall deliver to the carriers of butter whom they consider most worthy of the confidence of the public, a plate with a number. These men must, in every respect, conform to the police regulations.

Besides the prosecution of delinquents for adulterating or selling adulterated butter, the infraction of the foregoing rules may be punished by a fine from one to fifteen francs, and an imprisonment of one to five days, cumulatively or separately, according to the gravity of the offence.

Weights and Measures.—General Regulations.

The decimal metrical system of weights and measures established by the law of August 21, 1816, continues to be applied in Belgium. The proper standards are kept.

The verification of weights and measures is duly provided for, as is also the supervision of weights and measures. The excise clerk specially commissioned for that purpose inquires into, with the assistance of the *employés* of the registry, and the officers of judicial police, any offences against the regulations for weights and measures. The verifiers and assistant verifiers have the duty of also ascertaining offences against the law; they take an oath before the president of the tribunal of their department. The official report of these functionaries is received as true till the contrary is proved. Persons in business where weights and measures are used are liable to the visits of these functionaries as long as their places are open.

Other places not open to the public are also subject to these visits after sunrise and before sunset; but the clerk of the excise and the verifiers can only enter these in the presence of a commissioner of police, or a member of the Communal Administration; and the procès verbal shall, in that case, be signed by him in the presence of him who makes it. The produce of the fines derived from false weights and measures shall be divided among those making the procès verbal and the state. Nevertheless, when the prosecution takes place by the public officers the fine goes entirely to the treasury.

As regards penalties—1st. A fine of 20 to 25 francs is imposed on those who possess false weights, measures, or false weighing machines. 2nd. A fine of 10 to 20 francs on those who refuse to admit the visit of the proper officers. Those who possess or employ weights and measures prohibited by article 4 of the present law. A fine of from 5 to 15 francs will be imposed on those

who possess or employ weights, measures, casks, weighing machines, not marked in the prescribed manner.

The punishment of imprisonment is from one to seven days, according to circumstances.

In default of payment of the fine, the judge may order imprisonment not exceeding seven days, the prisoner to be released on payment of the fine.

When a person is condemned in costs for the benefit of the State, the duration of his imprisonment shall be fixed by the judgment, and must not be less than eight days or exceed one month; but if insolvent, the condemned, on showing his insolvency, according to law, will be liberated after seven days' imprisonment. Persons of seventy years and upwards cannot be imprisoned. In addition to this, all false weights, measures, and instruments will be seized, confiscated, and broken, but instruments which show no other irregularity beyond the loss of their verification mark will be simply seized, and restored after judgment, as also casks which do not bear the prescribed mark. Casks bearing false indications as to their contents are treated in the same way as false measures.

THE PARIS EXHIBITION.

Having indicated what we believe to be some of the most important facts to be remarked in connection with the machinery, hardware, and other leading branches of industry on the British side of the exhibition, and we last week pointed out some of the most glaring deficiencies, to-day we select some classes in which Great Britain is avowedly well represented.

The horological department of the English section forms one of the most attractive of its classes, and the admiration of well-informed foreigners is loudly expressed. Without waiting for the verdicts of the jury, it may fearlessly be affirmed that English chronometers, clocks, and watches have achieved a great triumph. In the case of marine chronometers, the triumph is perhaps more decided than in any other branch of the trade, and this fact is all the more important when we consider the very high place which the chronometer manufacture fills, both as regards scientific adaptation and manual skill. The show of chronometers is at once large and select. The exhibitors include Mr. C. Frodsham, who is also a juror, Messrs. Parkinson and Frodsham, Dent, Blackie, Johannsen, Kullberg, and Mercer, all of London, and Mr. Sewell of Liverpool, and it is not too much to say that England need fear no rival in this important branch of the trade.

In pocket chronometers, chronographs, and first-class watches of all kinds the show on the British side is magnificent; and the many new adaptations adopted for the improvement or the preservation of the mechanism prove that in this manufacture at any rate there is positive progress, scientific as well as industrial. High-class watches are exhibited by Messrs. Walker and Sons, Adams and Sons, Nicole and Cupt, Vivier, E. White, and by nearly all the chronometer makers above mentioned.

For excellent economical watches the English show is quite as remarkable as for the superior class just referred to; Messrs. Walker and Sons' watches for railway guards, engineers, travellers, and others, supply an example of good work at moderate cost. In the ornamental articles in the class the progress is as marked as in the rest; the decorations are generally in good taste and faultless in execution; Messrs. Dent, E. White, Walker and Sons, and Sewell show many examples of engraved and enamelled watches.

Mr. E. White exhibits specimens of chronometers and watches specially adapted to Turkey, India, and China, which may be taken as a type of the superior export trade of Great Britain. Messrs. Walkers' Indian regulators may also be quoted as examples of another important branch of the trade; and Mr. G. J. Oram furnishes a good collection of watches for the general export trade.

In large clocks, Messrs. Dent exhibit a model, with Mr. Denison's escapement, of beautiful workmanship; and Mr. Benson shows a fine turret clock, capable of carrying hands for a dial of 15 to 18 feet in diameter, and also a smaller specimen.

It is certainly not in the class of horology that we must look for evidences of England's decline. Nor must we seek it amongst the jewellers, whose productions form another of the highly-attractive portions of the English section, and are universally admitted to show a remarkable improvement in taste, with undiminished excellence of workmanship. This is so evident that no one questions it. One exhibitor in this class, Mr. Phillips, has taken up a peculiar branch, namely, the reproduction and application of the forms of ancient jewellery, Egyptian, Persian, Etruscan, Greek, and Roman. He also shows some jewelled and enamelled mountings of cut rock crystal and other precious stones.

Let us take another class, of a totally different character to both the preceding—the only bond between the three being that art enters more or less into them all—and visit the English ceramic court. In the class of brown stone ware, and especially in the important sections of chemical and sanitary pottery, Vauxhall stands alone, the size, regularity of form, and solidity both of body and glaze of the worms, bottles, acid jars, pipe joints, stop-cocks, and many other highly-important articles exhibit great advance, and leave all competitors further than ever in the rear.

In other branches of this class of industry England has a remarkably fine show, and the evidences of progress are noticed at every step. The substance of the porcelain and earthenware is finer and more solid, the glaze more even, the colours more brilliant and purer than ever. The forms, as well as the decorations of table and other household ware, become more elegant at each exhibition.

But it is in the ornamental pottery that the greatest progress is observable. Messrs. Minton have long been famous for their majolica ware, and the show which they make upon the present occasion certainly surpasses in quality any previous exhibition of theirs, while they present some important novelties. Amongst the latter, one of the most striking is the mixture of what is called parian enamelled with celadon coloured china; there is a case full of examples of this new style. In some instances the ground is of celadon, with opaque and semi-transparent ornaments of parian; in others the celadon is laid upon a parian ground, either solid or in thin transparent films that produce a very delicate effect, while in others the two materials are joined without being absolutely mingled. In one case the junction is made in a peculiar manner: the body of a vase is formed of china and painted, while the other portions are of parian, which will not take colours. Amongst Messrs. Minton's other novelties are some imitations of Limoges *grisaille* enamel ware, including a beautiful vase by an artist named Stevens; and specimens of stone china painted in solid and brilliant colours, imitating the famous old *cloisonnés* enamels of China.

Messrs. Copeland and Son exhibit, amongst other objects, a china vase, five feet high and of great purity of form and body, with flowers finely painted by Mr. Hurten, the neck and foot of delicate green and gold, some jardinieres, and a pair of smaller and very beautiful vases, decorated by the same artist; a splendid dessert service belonging to the Prince of Wales, and another with pierced edges and painted fruit; an ornamental set, decorated in a peculiar manner, in purple monochrome; dinner and other services with fillets and cyphers; some handsome painted earthenware panels for decoration; several specimens of improved jewelled ware, in the form of Verulam bottles and vases; specimens of a happy application of parian for the supports of centre pieces of dessert services; and a

curiosity in the way of gold decoration. In this case the gold is not laid on the surface of the ware, but is actually inserted, in the form of scales, with the surface level with that of the ware, and when the ware is completely finished the gold is engraved by hand.

Messrs. Wedgwood have a very fine show of their peculiar ware, known in general by their name, but in the trade as jasper ware. Many reproductions of Flaxman's charming designs, and other works conceived in the same spirit, as well as some novel applications of cameos and panels in a similar style. But besides this, they have a complete novelty, which has attracted great attention, a new kind of ornamental ware; the body is fine faïence, and the decorations are painted, with great skill, by Mr. Lessore, after whom this new faïence is christened. The subjects consist of landscape, animals, and flowers—some drawn from La Fontaine's fables and the works of other authors, and others original. This ware has found purchasers in the highest quarters. The Emperor of the French is stated to be one of Messrs. Wedgwood's customers, and the other great English potters have also been largely patronized in the same manner. Another of Messrs. Wedgwood's novelties which may be mentioned, is a service, decorated with designs from Chinese MSS., brilliantly painted by Mrs. Brownsword.

These are not the only classes in the group to which they belong in which England exhibits great excellence, and very marked progress, but these must be noticed in a future number.

The number of visitors to the Exhibition, for the time of year, surpasses all precedent and expectation; the receipts have exceeded £3,000 in one day, and the numbers, although fluctuating, are always large, yet the building is rarely crowded, except when there is a sudden shower of rain. One cause of this is the mass of attractions out of doors, and another, which deserves special notice, the great facility of ingress and egress by the radial avenues, or streets, as they are called, which connect the inner garden with the park; when visitors feel somewhat fatigued, and catch a glimpse of trees and grass through one of these openings, they naturally make for the open air, greatly to their own comfort, as well as that of others, and return refreshed to the study of the Exhibition itself.

THE PARIS EXHIBITION AND TECHNICAL EDUCATION.

The following letters have been addressed to the Editor of the *Times*:—

Sir,—The correspondence which you publish on this subject involves some collateral issues which seem calculated to divert the attention from the main subject under the heading which I have put to my letter. I am not disposed either to discuss or to admit the supposition that England has been at all points distanced by France and Germany. The important point, as it presents itself to my mind, is, whether we are not allowing them to attain a very marked general advantage in one important respect—namely, permitting them, by our neglect, to surpass us in their theoretical knowledge of the materials which they use, and in the best methods of working them up, whether derived from special acquaintance with the particular art, or from general instruction in mechanism and combination of materials. If this be so—and I believe it is—no man who values his time will care to discuss whether we can compete with the foreigner notwithstanding. We must surely compete upon better terms if we we can escape the disadvantage.

I have just revisited Paris after twenty-two years' absence from it. During the past twenty years I have been officially connected with education in England, and have for some time been engaged in the actual teaching of what the French call a special application. I thus had strongly impressed upon me both the alteration which has taken place here since 1845, and the comparative difference between the two countries; and I have thought you might like that I should give you my impressions.

In the first place, I find that the French have made immense advances in the application of small mechanism to the necessities of every-day life, and that they are now as far in advance of the English in this respect as we were beyond them in 1845. This is only one indication among many that there has been a general advance of this kind of knowledge; but I find something more in my observation of the people. I find them better disciplined, more attentive to small things, more alive to the necessity of applying their intelligence to detail, and better taught how to apply it. In the higher respect of pure mechanism I find that their detail occasionally errs in being too elaborate, but never from want of calculation or neglect of care. I find also that they are far more accustomed to submit, not only their main intention, but also their subordinate detail, to the test of exact or approximate numerical calculation, than is at all common with any but a few of our best mechanical designers. Lastly, I find that this is the result of a systematic plan of technical education pursued in France for now three-quarters of a century, in spite of war and revolution. This system is now bearing year after year increased fruit, and there is scarcely a large business in France in which the whole of the scientific knowledge bearing, even collaterally, on the subject is not fairly understood and mastered by those directly concerned in the business.

In England it is not a common thing to find theoretical knowledge combined with practical work. Practical mathematics are especially rare. There is nothing like the familiar habit which one sees every day exemplified here of working out every detail of mechanism or a chymical process by actual calculation and working diagrams. Some will say, doubtless, that we English do not need all this; for it is only the educated man who is capable of seeing how far his knowledge is deficient. But I have yet to learn that there is such a difference between man and man that any nation can afford to throw away the advantage of superior information.

Yet that is just what we shall do unless we take up vigorously and earnestly the work of technical instruction. There is a time in the military history of nations when individual prowess is sufficient to procure national supremacy; and there is a time in industrial progress when isolated energy and perseverance will secure manufacturing predominance. But there is a time in both when discipline and systematic training become necessary for the people to secure their position among nations; and that time, as I think, is now at hand for us.

It is quite true that our Universities teach mathematics in a way with which I should be the last to find fault, considering the purpose for which they are intended. But that purpose is wholly apart from the practical applications needed by the middle classes, and it is diverging more and more from what is chiefly useful to them. It is geometry rather than Euclid that they want, and it is mensuration rather than mathematical logic, which is of use to them. The middle classes cannot afford to spend their adolescence in an education which only opens the gate of knowledge; their instruction must be practical from the first, and there is no real impossibility in combining that accuracy of deduction, without which mathematics cease to be an exact science, with practical rather than logical applications.

I have no right to constitute myself the exponent of Lord Granville and Dr. Lyon Playfair, but as I read their letters their main object seemed to me to be to call attention to the disadvantages under which we lay from this want, which unquestionably exists among us, of technical instruction, and to the serious consequences which had already accrued, and were likely to be increasingly felt from this cause. It is putting the ques-

tion on a false issue to answer them as if their object were a mere comparison of our existing manufactures. In so far as my own limited experience is concerned, both of men and of mechanism, of students and teachers, I do not think that they have exaggerated in any way the danger.

At the same time I have no fears for our country, provided we really, as a nation, recognize the need, and apply ourslves to the remedy. But it must not be supposed that we have a light task before us. Our teachers, as well as our schools, have yet to be produced.

I have, &c.,

Charles W. Merrifield, Principal of the School of Naval Architecture.

Paris.

Sir,—The expression, "technical education," has recently appeared in your columns, but without any precise definition. What is "technical education?" Let me try to answer that question by giving an illustration drawn from a particular department of manufacturing art to which I have especially devoted my attention during the last five-and-twenty years, and during sixteen of which I have been engaged in the work of instruction connected with that department. It is necessary that I should make this statement, because certain of your correspondents on the subject have sought to gain the ear of the public by announcing their own more limited experience as teachers of what they designate "a special application." In the extraction of iron from its ores a series of processes is resorted to with which many of your readers are familiar. First comes that of smelting, which consists in exposing the ore in admixture, say, with limestone, to a high temperature in a gigantic furnace urged by powerful blasts of air injected near the bottom. The fuel may be charcoal, coke, or coal, and in every case it is in direct contact with the ore and limestone. The products are what is known as pig or cast iron, and a more or less glass-like substance, known as slag or blast-furnace cinder. This cast iron is not pure iron, but is compounded of pure iron and carbon, with the addition, it may be, of silicon, sulphur, phosphorus, manganese, and other matters. Next follows the process of puddling, whereby this easily fusible non-malleable, non-ductile, unweldable metal is converted into the difficultly fusible, malleable, ductile, weldable metal wrought iron, or that variety of iron in commerce which most closely approximates to the chymically pure metal; or, in the case of suitable kinds of pig iron, the Bessemer process may be adopted as a substitute. Lastly come the processes by which steel may be derived, either directly or indirectly, from cast iron. Now, Sir, all the processes which I have thus briefly referred to may be, and are, successfully carried on by men wholly ignorant of the chymical differences between wrought iron, steel, and cast iron, and of the chymical phenomena which occur in those processes. Such men have a merely empirical knowledge of the metallurgy of iron, acquired by tradition and the education of both eye and hand. But the man who knows the essential nature of wrought iron, steel, and cast iron, and who is acquainted with the chymical changes that are made in the process of smelting, and in the other consecutive processes, has a scientific knowledge of the subject. It is only this latter branch—that is, the principles of this manufacturing art—that can form the subject of instruction at metallurgical or mining schools. The knowledge of the other, or practical branch, can only be acquired at ironworks. That a knowledge of the principles of this art may lead to improvement and to great practical results could easily be demonstrated by numerous examples—examples, indeed, so numerous, that I would undertake to fill six columns of the *Times* with the record of them. Let it not be supposed that no technical instruction has been provided in England in the great subject of metallurgy and the kindred arts, and instruction, too, provided by the Government. Not many years ago, notwithstanding the prominent position which Great Britain then held among the iron-producing nations of the world, scarcely a chymist could be found in any ironwork in the kingdom, and such a thing as an analysis of an iron ore or of iron was hardly ever thought of. What is the fact now? Why, the absence of an expert chymist from a great ironwork is the exception, and not the rule. I could supply you with the names of able chymists thus scattered through our ironworks. And what is true of iron-work is equally true of other branches of practical metallurgy. During the last few years I have had the opportunity of seeing the examination papers on metallurgy of working men, sent to the Science and Art Department at South Kensington, from various parts of the United Kingdom, and I say with confidence that at least in that branch much progress has been made in the diffusion of "technical education." The press, also, has done, and is doing, great and useful work in this direction. I am personally acquainted with many of our chief metallurgical works and have had ample opportunities of conversing with the working men they employ, and I have been delighted to observe their desire for knowledge concerning the principles of their art, and on many occasions how much knowledge of those principles they had obtained. It is untrue to allege that there is no technical education in England, and those who made the allegation ought to have known better. I speak of what I know respecting one great branch of manufacturing industry in this country, and I am prepared to maintain what I here assert. Do not let me be misunderstood. The value of what is called "technical education," or education specially directed to manufacturing art, cannot be overestimated. The Government has taken the initiative in this matter, and the nation has already begun to reap the advantage; and, I might say, other nations too, for I could give a list of men from the continent of Europe, from Australia, from India, from South America, and from the United States, who have received special technical education in England—nay, even in London. Let us not only go on as we have been going on during the last 15 years, but redouble our efforts if necessary. There is no ground for alarm. We cannot hope to excel in all things. It is probably not expedient that we should. There are other people in the world as wise and energetic as ourselves. But, so far as our national resources will permit, there need be no apprehension of our being beaten at least in practical metallurgy by the rest of the world.

I am, Sir, your obedient servant,

June 12. Y.

Fine Arts.

Restoration of Ancient Edifices in Paris.—Visitors to Paris this year will find several interesting buildings recently restored or now under hand. The ancient priory of Saint Martin des Champs, occupied by the Conservatoire des Arts et Metiers, has been many years in the hands of the restorer, and is now approaching completion; the priory church has long been occupied by machinery in motion, but the apse, which is very fine, has only recently been restored. The outside of the church, like most cathedrals and other ecclesiastical edifices on the Continent, is masked by a row of wretched tenements, which are now being removed. Visitors who are not acquainted with Paris must not omit to visit the ancient refectory of the priory, a very remarkable building of the 13th century, attributed to Pierre de Montereau, which stands parallel to, and not far from, the inner wall of the church, and is now the library of the Conservatoire; it is a curious, long, narrow structure, with a row of columns up the centre. The restorations of Notre Dame are now entirely terminated, with the

exception of a portion of the side chapels and some subsidiary work. The whole of the main structure is restored, and the general effect is excellent. The upper floor of the beautiful *chapelle* of Saint Louis was completely restored and embellished some years ago, and the lower chapel is now in the hands of the restorers, and approaches termination. The city of Paris is occupied with the restoration of the Hôtel Carnavalet, which is destined to contain the museum of the antiquities of Paris. The opening up of new streets not far from the central markets, has laid bare one of the most remarkable monuments in Paris, namely, the tower of the ancient residence of the Dukes of Burgundy, built by Jean Saint Peur, which is fortunately in an excellent state of preservation. This will be a remarkable addition to the architectural antiquities of Paris, for it has been completely masked for a long period by houses, and lost to all but earnest students; it is an admirable specimen of the Burgundian architecture which is seen in such grand forms at Dijon, the capital of the once powerful Dukes of Burgundy. The city of Paris has also recently acquired the Hôtel de Sens, occupied in the middle ages by the Kings of France and the Archbishops of Sens, and is about to cause it to be restored.

Exhibition of Works of Art at Bordeaux.—The catalogue of this exhibition contains 588 entries, including works by Diaz, Landelle, Théodore Rousseau, and several other painters of eminence. The municipal council purchased two works by M. Dauzats and M. Chabry, both natives of Bordeaux, for the museum of the town, for 6,000 francs; the society directing the exhibition made purchases to the extent of 22,500 francs, and private amateurs to the amount of 35,000 francs, making altogether a total of £2,540.

Manufactures.

Liebig's Artificially Prepared Milk.—This celebrated chemist has made a communication to the French Academy of Sciences on the subject of prepared milk. He says that the composition of milk is not uniform; the proportions of caseine, sugar of milk, and butter vary, as is well known, with the nature of the mother's food. "I take," says M. Liebig, "for the base of my composition the normal form of woman's milk, after the analysis of M. Haidlen, of Giessen, and of which 1,000 parts contain 31 parts of caseine, 43 of sugar of milk, and 31 of butter. The plastic and heat-giving substances in this milk amount to 10 in 38; in that of the cow unskimmed, as 10 to 30; and in the same skimmed, as 10 to 25. I employ for my preparation skimmed milk, wheat flour, sprouted barley, and bi-carbonate of potash. It cannot be said that starch is unfit for the nourishment of infants; but it is nevertheless true that its transformation into sugar in the stomach imposes useless labour on the organisation of the suckling; this is spared by first converting the starch into sugar, or soluble dextrine. This consideration accounts for my use of germinated barley, or malt, in my preparation; it is also important that the consistency of the mixture should be such that it can be administered by means of a feeding-bottle." The preparation of the artificial milk is thus described:—Sixteen grammes of flour are boiled in ten times its own weight of skimmed milk until the mixture is perfectly homogeneous; it is then removed from the fire, and immediately afterwards is added to it 16 grammes of the barley ground in a coffee mill, and mixed with twice its weight of cold water and three grammes of a solution of bi-carbonate of potash, consisting of 11 parts of water to two parts of the salt. After the addition of the barley and bi-carbonate, the vessel is placed either in hot water or in a warm position until the mixture shall have lost its thickness, and assumed the consistency of cream. At the end of fifteen or twenty minutes the vessel is again placed on the fire and allowed to boil for a few seconds, after which the milk is passed through a close linen or hair strainer, in order to clear it of its fibrous matter of the barley. Before giving this milk to the child, it should, however, be allowed to stand at rest, so that the finer fibrous matter still held in suspension may subside. Milk prepared after this method contains almost exactly the same flesh-making and heat-giving substances as normal woman's milk, that is to say, 10 in 38, and after being carried to the boiling point it will keep good in summer for twenty-four hours.

Glycerine Glue.—A German chemist, M. C. Puscher, has discovered that, if glue or gelatine be mixed with about one-fourth of its own weight of glycerine, it loses its brittleness, and becomes applicable for many purposes for which it is otherwise unfit. M. Puscher uses mixtures of this kind for dressing leather, preparing artificial bones, for giving elasticity to parchment and porcelain, or enamelled paper, and for bookbinding. A cement composed of starch, glycerine, and sulphate of lime is said to remain plastic and adhesive, and is recommended for luting chemical and philosophical apparatus, and other similar purposes. Glycerine glue is said to possess many of the qualities of india rubber, and particularly that of erasing the marks of blacklead pencils. If wax be added to a mixture of gelatine and glycerine, and zinc yellow be used as a ground for the application of aniline red, the colour produced is said to be brilliant in the extreme.

Commerce.

International Maritime Exhibition at Havre.—A very interesting exhibition is announced to take place at Havre in the spring of next year. The word maritime is used in the very widest sense, as will be seen by the following extracts from the classification:—The exhibition will be divided into 43 classes, in five groups:—1. All that appertains to navigation, construction, rigging, fittings, and machinery.—2. Samples of all the commodities which enter into the commerce of Havre, textiles, colonial produce, indigenous commodities, cereals, fruits and seeds; dye stuffs, fatty substances, wood, metals, &c.; one class being reserved for the exhibition of methods of packing, for which our neighbours, the French, have a remarkable superiority over ourselves.—3. Fishing tackle, apparatus, implements, and accessories of all kinds, whether relating to deep-sea, river, or shore fisheries; and plant and utensils for the preparation of fish, either on the spot where they are taken, or elsewhere.—4. Agricultural implements and produce.—5. Art as applicable to the marine, such as models and sections of vessels, &c.; and art proper, such as pictures, studies, water-colour drawings, marine photographs, &c., manuscripts, books and pamphlets relating to the history of maritime science, and treating of the importance of international maritime commerce, with a view to general progress, humane societies, &c.; aquatic sports, founded either on historical events, or fabulous and legendary subjects. The plan also includes a salt-water aquarium, on a grand and new plan, in which may be exhibited all the interesting and rare species of fish found in the embouchure of the Seine, the Channel, the North Sea, and the ocean. Yachts and pleasure-boats of all kinds are also included in the programme. All applications for space are to be made before the 1st of January, either to the direction of the exhibition at Havre, or to the agents appointed to represent it abroad. The managers have determined to charge the following fixed fees for space, to cover expenses, insurance, and surveillance. In enclosed galleries, 25 fr. per square metre, 15 fr. the half-metre, and 10 fr. the quarter metre; on the inner wall, 10 fr. per metre; in

the open air, 5 fr. per metre, or with permission to erect sheds or roofs, 10 fr. No charge will be made for pictures or other works of pure art. Books, memoirs, &c., to pay 5 fr. each, but the direction will supply the necessary book-shelves, &c. Exhibitors may either provide their own counters or stands, or the management will undertake them at the following rates:—Counters or supports, capable of carrying objects weighing up to 4 cwt., 5 fr. per metre; 3 fr. for the half; and 2 fr. for the quarter metre. Exhibitors paying more than 100 fr. to the direction will have certain advantages in the way of publicity by means of advertisement within the building itself and in the columns of the *Gazette de l'Exposition*, and other exhibitors may obtain the same advantage by the payment of 25 fr. This plan of charging, at fixed rates, for space, and other matters, is new, and may be worthy of attention with regard to local or special exhibitions where the general attractions are unlikely to promise sufficient income to cover expenses.

The History of Beetroot Sugar.—The following remarks on the above subject, says the *Toronto Weekly Leader* of May 24th, are taken from a recent pamphlet which is now attracting a good deal of interest in Canada:—In 1810, M. Deyeux, a member of a committee previously appointed by Napoleon I. to investigate the subject of the manufacture of beet sugar, made his report, and presented two loaves of sugar equal in every respect to the best sugar from the cane, but neither the percentage of sugar obtained nor the cost of production was given. Reports not well verified were published, that in Germany from 4 to 6 per cent. of sugar had been obtained. By the experiments of M. Barruel, from 50 to 60 per cent. only of juice was obtained from the beet, whereas the production at the present time is from 80 to 85 per cent. The yield of sugar was about 1½ per cent., while at the present time in France it is about 7 per cent.; in Germany, 8 to 9 per cent.; and in Russia, 9 to 10 per cent. The cost was nearly 30 cents. per pound, while at the present time it is about 4 cents. M. Derosne, a Frenchman, obtained in 1811 about 2 per cent of sugar from the beet. Other experiments yielded 2½ per cent. A factory working 500 tons of beet in a season was considered quite extensive. There are establishments now in operation that work 60,000 tons. A rasp then worked about 3 tons per diem. Now from 150 to 300 tons a day are consumed by one rasp. In 1812 the cost of manufacturing sugar was about 9 cents. per pound. Chemical schools and imperial factories were established, and Government ordered the cultivation of 100,000 acres of beet. In December, 1814, favourable tariff duties infused new life into the industry; manufacturers introduced great improvements in their establishments, to such an extent that they obtained 70 per cent. of juice from the beet, in lieu of 50 and 60 per cent. The yield of sugar was from 3 to 4 per cent., and of molasses about 5 per cent. M. Crespel Delisse claimed that he obtained 5 per cent. sugar and 4 to 8 molasses. The cost of manufacturing was about 7 cents. per pound. From 1822 to 1830 the number of manufactories largely increased. The yield of sugar was about 5 per cent., and the cost of production about 5½ cents. per pound. In 1825 France produced 5,000 tons of sugar in over 100 establishments. From 1830 to 1836 great progress was made. The sugar produced was of improved quality, and amounted to about 5 per cent. of the weight of the beet worked. The introduction of steam power increased the means of production ten-fold. In 1836, 436 factories were in operation. Since 1840, the production of beet sugar in France has doubled every ten years. There were 60 manufactories of beet sugar in Austria in 1846; in 1865 the number had increased to 140. The states of the Zollverein have nearly quadrupled their production in the past 15 years, 52,586 tons having been produced in 1850, against 180,000 tons in 1865-6. The intimate relation between this branch of industry and agriculture developed itself, and there were no longer unimproved lands in the vicinity of a sugar manufactory. In the department of the North, where the industry was most firmly established, the number of acres under cultivation in grain increased enormously, the beet pulp furnishing farmers with the means of feeding an increased number of cattle, thus providing the means of fertilising an increased amount of land. *L'Echo Agricole* says that "all farmers who obtain first prizes at the agricultural exhibitions are either sugar manufacturers, distillers, or cultivators of the beet. Those who have adopted this branch of agriculture, either as proprietors or tenants, have obtained really astonishing results. M. Vallerand, who took the first prize in the department of Aisne, bought, in 1853, a farm of 832 acres, the sales of produce of which amounted to 8,000 dollars. In 1859 it produced 41,200 dollars. M. Dargent, who took the first prize in the department of Seine Inferieure, cultivated only 50 acres. He so increased the production of this farm that he obtained 154,000 pounds, or 68 tons and 168 pounds, of beet from a single acre. The culture of the beet involved the necessity of deep ploughing, heavy manuring, and thorough weeding. The pulp from the juice extracted in the manufacture is an excellent food for cattle, the number of which has been increased in the districts devoted to that industry, from eight to ten-fold since the introduction of sugar making. The cattle furnish an immense amount of manure, which, applied to the deeply ploughed and well weeded beet lands, enhances their productiveness for the cereal crops."

Colonies.

The Grain produced in Victoria.—At a show of grain and other produce, under the auspices of the Board of Agriculture, the grain was the best ever seen in the colony. As large prizes were offered, the wheat had to be shown in lots of 40 bushels each, and the first prize sample weighed 68 lbs. 6 oz. per bushel, the second best weighing 68 lbs. 14 oz., but it was not so clear and pure, and the third lot the same as the first. The prize barley was shown in lots of 20 bushels each, weighed from 58 lbs. 2 oz. to 58 lbs. 6 oz., and the short oats from 46 lbs. to 50 lbs. 12 oz. to the bushel.

The Exports from Queensland last year show a moderate increase over the previous year, the totals being, 1865, £1,153,104; 1866, £1,366,491. There was a steady progress in everything but gold dust and tallow, in which there was a small decrease. The exports of timber are much increased, and copper ore has nearly doubled in the year, the exports being for 1866, £33,918. The shipment of cotton wool increased from £12,197 to £19,618. The exports of live stock are nearly six times larger than in 1865, amounting to £38,970 in 1866.

Obituary.

Sir Thomas Phillips, Q.C., was born in the year 1801, in the little mountain valley of Llanelly. His father was one of the managers of the neighbouring works, and his mother, to whose influence he was accustomed to trace much of the energetic sense of duty which characterised him, was one of the Jameses of Llangottock, representatives of Sir David Gom. He was articled to a solicitor, and at the expiration of his articles he became partner in the firm which, under the name of Prothero and Phillips, held the leading position in that part of the kingdom. It was while he was Mayor of Newport that the disaffection in the mining districts of South Wales culminated in the Chartist outbreak of 1839, to the imminence of which he had repeatedly, and in vain, called the attention of the Government. Having obtained the assistance of 30 soldiers, under a young subaltern,

he awaited the approach of the insurgents in the Westgate Hotel, and while opening the most exposed shutter of a bow window, to enable the troops to fire, he was seriously wounded in the arm and side. After the repulse of the rioters he continued to attend to business, and his brother, the late Mr. B. Phillips, F.R.S., F.R.C.S., an eminent surgeon, saw considerable reason to dread lockjaw, but happily this did not supervene. Soon after his recovery he received the freedom of the City of London, the thanks of various public bodies, and a service of plate, and was knighted by the Queen at Windsor. He then proceeded on a tour in the East, taking with him the unfortunate artist Dadd, and on his return was called to the bar, and obtained considerable success in Parliamentary practice. He now threw himself into various public and charitable pursuits, and became an active member of the governing bodies of the National Society, King's College, the Church Institution, and other kindred societies in the metropolis. At the same period he founded a school near his colliery at County Bella, which became the model of those which have contributed largely to convert the disaffected natives of those districts into peaceful and loyal subjects. To him was mainly owing the success of Brecon College, in whose management, as well as that of many charities in the diocese of Llandaff, he took an active interest to the end of his life. He was an active member of the country magistracy, and for several years acted as Deputy-Chairman of Quarter Sessions for Monmouthshire. He became eventually a Queen's Counsel and a Bencher of the Inner Temple. Sir Thomas Phillips received a service of plate for his services as Chairman of the Committee of Creditors when the failure of the Newport banks threatened disaster to the whole neighbourhood. In July, 1860, he was elected Chairman of the Council of the Society of Arts, and served the office for three years, including the period of the International Exhibition of 1862, this being the first occasion of the Society's altering its rules with regard to the re-election of its chairman. He was again elected in July, 1866, and held the office at the time of his death. He was addressing a Committee of the House on Tuesday, May 21st, when he was struck with paralysis. He never lost consciousness, and was removed in Sir Thos. Watson's carriage to his nephew's house in Gloucester-place, where he expired on the following Sunday. His remains were removed to Llanellen, where he was buried near his father and mother. In him the poor have lost a kind and discriminating friend, and the Society a valuable and energetic supporter.

Notes.

Royal Academy of Sciences, Belgium. — The Academy has issued the four following subjects, for prizes of the value of one hundred francs, to be awarded in the year 1868:—1. Examination and discussion of the methods in use to ascertain the declination, inclination, and magnetic intensity of the earth, as well as the secular and diurnal variations.—2. Discussion and improvement with respect to any important point of the theory of the form of waves.—3. A complete study of a natural organic alkaloid, containing azote and oxygen, quinine in preference to any other; the object being to elucidate the constitution of this substance, and to determine the place which it should occupy in serial classification.—4. The anatomic composition of the egg in various classes of the animal kingdom, its mode of formation, and the functions of the various parts of which it is composed. The papers to be written in Latin, French, or Flemish, and sent in before the 1st August, 1868, with name of author, in a sealed letter, to Mr. Quetelet, perpetual secretary of the Academy. It is not stated whether the prizes are offered for general competition.

Correspondence.

Our Rivers and Water Supply.—Sir,—The reported saying of a great but unlearned engineer, "that rivers were created for the supply of navigable canals," has been one of the causes of their very neglected state, for the principal object held in view in the management of our rivers has always been inland navigation and water-power, as matters of considerable importance to former generations, but now falling into disuse, and for which we of the present generation are called upon to expend large sums in order to remedy the almost irreparable injuries inflicted upon every river and its tributaries throughout the kingdom. The question of water-supply, now so much agitated, must be solved by reference to the great laws of nature, as established by infinite power and wisdom, and not by having recourse to entirely artificial arrangements, which, whatever their nature, will still further contribute to the destruction of our rivers; whereas the enactment of a simple law to prohibit, after a certain period, the existence of dams and weirs for any purpose whatever in any river or its tributaries, so that it may have a clear course from its head to the sea, will be quite sufficient for the purpose of procuring an ample supply of pure water to all the inhabitants of the land; provided, of course, that at the same time all gross town sewage and refuse of manufactories be also prohibited from defiling our river waters. The storage of winter floods and their restoration to the river during the dry months, are proceedings closely allied to the well-known system of warping, which, though it may render some lands fertile by the deposition of silt, is ruinous to the river, and is at times the cause of terrible destruction. For it is an undoubted axiom, that every drop of water lost to the river in time of flood causes a proportional rise in its bed, and consequent disastrous inundations at every extraordinary overflow. The principle of storage, so strongly recommended in the paper on the subject of "Water Supply," read at the meeting of the Society on Wednesday, the 5th instant, must therefore be condemned as not only expensive, dangerous, and inefficient, but also as certain to entail enormous future outlay in the management of our rivers, which can only be considered in one light, namely that of their being the natural drains of the country they traverse. In order to promote that object, they must be so directed as to scour out their beds as deep as possible in respect to the land. They must not be hampered with arbitrary obstructions, and must be kept in their true course by means of embankments where necessary, sufficiently high and permanent to prevent any loss of water during the time of any extraordinary flood, and excessive bends should also be obliterated by means of short cuts. If the isthmus forming the Isle of Dogs were cut through, so as to straighten the course of the river, the increased scour would in time very much lower all the sand-banks and shoals from that point to the Nore, besides affording, without cost, almost unlimited dock-room in the intercepted portion. Vested rights in dams, weirs, and locks are now nearly null and void, for the Canal Commission is in a state of bankruptcy, and was so previously to the advent of the railway system, for the inland navigation dues, like their relatives the turnpike tolls, never produced sufficient funds to meet interest, repairs, and restorations, seeing that all the locks and weirs are universally in a state of complete rottenness. In fact, application has been threatened for Parliamentary assistance, and we are to be taxed for the benefit of millers, manufacturers, and canal bargemen, over and above all costs, losses, and damages arising from the past, present, and increasing dilapidation of our rivers, both large and small. I cannot conclude without noticing the infatuation which prevails in regard to water-side premises, where you will see the pump applied to clear the basements from water after

every extraordinary tide, which happens at least twice in every year. Witness the new Palace at Westminster, and the Abbey, so built that at every high tide the basements are flooded, a situation which, in the case of the Parliamentary buildings, has added a million or two to their necessary cost.—I am, &c., Henry W. Reveley.

1, Baker-street, Reading.

Water Supply.—Sir,—In the discussion on Mr. Bailey Denton's interesting paper, "On the Water Supply of the Metropolis," on the 5th inst., in the second part of my observations, what I meant to convey was the necessity of drainage as a preliminary to the successful culture of strong, wet lands; also that, useful as Italian rye-grass was found to be, it is a great exhauster, and where the land was not in very good heart, I had seen on three farms in different localities the succeeding crop almost a failure.—I am, &c., W. Botly.

Upper Norwood, June 10, 1867.

MEETINGS FOR THE ENSUING WEEK.

Mon.....British Architects, 8.
Asiatic, 3.
Victoria Inst., 8
United Service Inst., 8½. Capt. A. Walker, "On the Dress and Equipment of the Army."
Tues ...R. Horticultural, 3. General Meeting.
Statistical, 8.
Anthropological, 8.
Wed ...Meteorological, 7. Annual Meeting.
Geological, 8. 1. Mr. S. V. Wood, jun., "Post-glacial Structure of the Thames Valley." 2. Dr. Duncan and Mr. J. Thomson, "On *Cyclocyathus*." 3. Mr. J. W. Salter, "Tracks of Pteraspis in the Upper Ludlow Sandstone." 4. Rev. J. H. Timins, "Chemical Geology of the Malvern Hills." 5. Mr. T. M. Hall, "Fossils of the North Devon Series." 6. Mr. W. R. Swan, "Geology of Princess Islands, Sea of Marmora." 7. Dr. Collingwood, "Sulphur Springs of Formosa." 8. Mr. G. B. Stacey, "Geology of Benghazi, Barbary." 9. Dr. Haast, "Geology of Canterbury, N.Z." 10. Dr. Dawson, "New Carboniferous Mollusk." 11. Mr. E. Thornton, "Coal of Brazil."
Thur ...Royal, 8½.
Antiquaries, 8½.
Linnæan, 8.
Chemical, 8. 1. Mr. Perkin, "On Derivatives of Hydride of Salicyl." 2. Dr. Phipson, "Analysis of Biliary Concretions." 3. Dr. Gladstone, "Pyrophosphoric Acid."
Numismatic, 7. Annual Meeting.
Philosophical Club, 6.
Fri .....Royal Inst., 8. Professor Tyndall, "On some Effects of Sonorous Vibration."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 5th June, 1867.

Par. Numb.
177. Bill—Valuation of Property (amended).
318. Fire Insurances—Return.
323. Mercantile Marine Fund—Account.
336. Electoral Statistics (Scotland)—Returns.
337. Civil List (Ireland)—Return.
340. Railways—Report by the Board of Trade.
Public Petitions—Twenty-eighth Report.

Delivered on 6th June, 1867.

180. Bill—Court of Chancery (Ireland) (amended).
182. ,, Pawnbroking.
183. ,, Linen and other Manufactures (Ireland).
184. ,, Dogs Regulation (Ireland) Act (1865) Amendment.
310. Victoria—Correspondence.
341. Parliamentary Boroughs and Counties—Amended Return.
Manufactures, Commerce, &c.—Reports by Her Majesty's Secretaries of Embassy and Legation (No. 5).

Patents.

From Commissioners of Patents' Journal, June 7th.

Grants of Provisional Protection.

Belting, machine—1524—A. M. Clark.
Boats, apparatus for lowering, &c.—1469—A. V. Newton.
Boilers—1464—W. R. Lake.
Boilers, &c.—1467—S. Regan.
Bottle stoppers—1437—W. D. Tate.
Butter cases—1546—L. Slatter.
Carriages, &c.—1441—G. Coles, J. A. Jaques, and J. A. Fanshawe.
Cartridges—1514—A. V. Newton.
Charcoal box-irons—1506—G. Hurdman.
Charcoal, treatment of animal—1512—J. Stenhouse and J. Duncan.
Cisterns, regulating supply of water to—1474—J. T. and E. J. Bland and T. Brevetor.
Earthenware, manufacture of articles of—1538—T. G. Green.
Fabrics, looped—1510—S. H. Foster and T. Bunney.
Fabrics, &c., drying—1389—J. Johnson and A. Giles.
Fibrous substances—1455—J. Denis.
Fire extinguisher—1542—J. M. Muterse.
Flooring—1548—G. Howard.
Furnaces—1494—H. Chamberlain.
Grain, &c., apparatus for landing—1540—L. Stuckenschmidt.
Hat covers—1277—A. Brunier.
Hides, dressing—1518—J. Collins and J. Smethurst.
Iron ore, treating—1461—A. L. Dowie.
Iron ores, treating—1498—E. Young.
Lead, manufacture of white—1465—W. R. Lake.
Lime kilns—1445—P. A. De Berenger.
Liquids, drawing off and refining—1421—W. Sodo.
Looms—1457—H. Peel.
Looms—1544—T. W. Helliwell.
Metals, boring—1550—T. Greenwood.
Mineral substances, treating—1443—E. Edwards.
Nail-cutting machines—1453—J. Sadler.
Paper folding machines—1502—J. Davies.
Paper folding machines—1536—S. and T. Atkinson.
Photographic apparatus—1526—W. E. Newton.
Pickers—1508—S. and G. Holt.
Presses, arming—1504—J. Gough.
Pressure machines—1528—A. A. Hely and J. Marshall.
Printing machinery, intaglio plate—1447—J. M. Napier.
Projectiles, construction, &c., of—213—T. Berney.
Rollers, steam road—1500—D. Thomson.
Sacks, apparatus for filling—1492—C. D. Abel.
Sail yards—1496—E. Bond.
Sewing machines—1451—C. E. Brooman.
Sewing machines—1481—J. White.
Sewing machines—1516—J. Mabson.
Signals, railway—1471—J. L. Clark.
Steel, manufacture of—1520—J. Hargreaves and T. Robinson.
Telegraphic despatches, letters, &c., conveyance through tubes—1532—C. W. Siemens.
Violet colouring matters—1433—E. Smith.
Water closets, ships'—1473—J. Sloan.
Wheels—1439—G. Nimmo.
Wool, washing—1477—A. H. Brandon.
Wool, &c., machinery for combing—1435—C. Perry.
Yarns—1431—C. Brazil and R. Grime.

Invention with Complete Specification Filed.

Photographs, harmonising the lights and shades in—1593—F. B. Gage.

Patents Sealed.

3242. W. Warren.	3291. T. Berney.
3245. A. S. Stocker.	3353. S. Hall.
3247. W. F. Smith and A. Coventry.	3358. T. Huckvale.
3249. W. C. Nangle.	3366. G. Allix.
3251. W. Hopkinson.	3418. A. V. Newton.
3256. C. E. Brooman.	3429. G. Haseltine.
3257. C. E. Brooman.	44. W. E. Newton.
3279. H. W. Ripley & T. Barker.	629. H. W. Hallett.
3290. A. Woods.	1078. W. R. Lake.

From Commissioners of Patents' Journal, June 11th.

Patents Sealed.

3262. R. B. Boyman.	3342. G. B. Finch.
3264. T. Jones.	3348. S. Parry.
3268. H. Wren and J. Hopkinson.	3371. W. Clark.
3269. I. Baggs.	3382. J. S. Benson and J. von der Poppenburg.
3274. C. Sinibaldi.	
3281. C. C. Adley.	3389. J. Rodgers.
3292. T. V. Morgan & E. Hyles.	177. A. Apps.
3301. A. Rollason.	385. W. E. Newton.
3303. J. W. Swan.	842. H. Wilde.
3307. C. E. Brooman.	1028. W. E. Newton.
3321. J. M. Gray.	1050. W. E. Newton.
3331. G. Davies.	

Patents on which the Stamp Duty of £50 has been Paid.

1393. W. T. Cheetham.	1441. R. A. Brooman.
1403. W. E. Gedge.	1446. J. Foxley.
1407. T. Aveling.	1460. W. Martin, jun.
1409. E. J. Hughes.	1463. J. G. Marshall.
1436. M. Henry.	

Patents on which the Stamp Duty of £100 has been Paid.

1406. M. Jacoby, J. Redgate, and J. Stones.	1425. J. Combe.
2052. E. T. Truman.	1434. J. B. and J. Farrar.

Journal of the Society of Arts.

FRIDAY, JUNE 21, 1867.

Announcements by the Council.

VISIT TO THE PARIS EXHIBITION.

The Council have directed the Secretary to make arrangements for a visit of the members of the Society to the Paris Exhibition. The period for this visit is not yet fixed, but it will probably be towards the latter end of July.

ARTIZANS' VISITS TO PARIS.

The Council of the Society of Arts, feeling the importance of promoting the intelligent study of the Paris Exhibition and the manufacturing establishments in France by artisans of the United Kingdom, have appointed a Committee in furtherance of this object, and on their recommendation, have passed the following minute :—

At the last and former International Exhibitions held in this country, arrangements were made by the French Government, to facilitate the visits of skilled artizans, and interesting reports on the exhibitions were made by them to their government. Believing that such visits on the part of skilled workmen to these great international displays not only exercise a beneficial influence upon the men themselves, but also upon the progress of industry in the country to which they belong, the Council of the Society of Arts have resolved to raise a fund to be employed, in aiding a limited number of English workmen to proceed to Paris for the purpose of studying the present French Exhibition.

To carry this object into effect, they have agreed on the following plan :—

1st. That a number of selected workmen (the number to depend on the amount of funds at the disposal of the Council) shall be assisted to proceed to and remain in Paris a sufficient time (say three weeks), for the purpose of making a careful study of the exhibition, and of such factories and workshops as they may desire to visit.

2nd. That every man so assisted shall, on his return, make a report to the Society of what he has observed during his stay, in reference to the special industry in which he is engaged, and that it be made a condition of the grant to each man that one-third of the amount be retained until his report shall be supplied to the Society.

3rd. The Council think it will be undesirable to fix the exact time for, or to prescribe the duration of, these visits, or to interfere with any of the arrangements the men may desire to make for their own accommodation; but, in order that they may take advantage of the facilities provided by the Commission organised by the French Government for the study of the exhibition, the men will be placed in communication with that Commission on their arrival in Paris.

4th. A considerable sum will be required satisfactorily to accomplish the important object undertaken by the Society, and, in order to raise these funds, the Council have determined to appeal to the members of the Society, who must be interested in the successful results of this movement, in the belief that they will not hesitate to join in a subscription for the furtherance of the undertaking; and they propose at the same time to communicate with the various Chambers of Commerce, inviting their counsel and support. The Council have decided to commence the subscription by a vote of one hundred guineas from the funds of the Society.

Members are invited to aid the Council in this undertaking by subscriptions, which should be forwarded to the Financial Officer at the Society's house.

The following is the list of subscriptions up to the present date :—

H.R.H. the Prince of Wales, President	£31	10	0
Society of Arts	105	0	0
Earl Granville, K.G.	5	0	0
Lord de L'Isle	10	0	0
Thomas Twining	2	2	0
Sir J. P. Boileau, Bart.	5	0	0
George Godwin, F.R.S.	1	1	0
Vice-Chancellor Sir W. Page Wood, F.R.S.	10	0	0
W. H. Bodkin (Assistant-Judge)	3	3	0
Sir Rowland Hill, K.C.B.	3	3	0
Benjamin Shaw	2	2	0
Alfred Davis	10	10	0
Eugène Rimmel	5	5	0
Frederick Mocatta	2	2	0
James Marshall	2	2	0
Robert Dawbarn	1	0	0
Henry Vaughan	10	10	0
Philip Sancton	5	0	0
Somerset A. Beaumont	5	0	0
G. Dixon, Mayor of Birmingham	5	5	0
Messrs. Smith and Wright, Birmingham	5	5	0
Messrs. Griffiths and Browett, Birmingham	5	5	0
Henry Weiss, Birmingham	2	2	0
W. H. M. Blews, Birmingham	2	2	0
W. Middlemore, J.P., Birmingham	5	5	0
Thomas Lloyd, Birmingham	2	2	0
Messrs. Elkington and Mason, Birmingham	5	5	0
Messrs. John Hardman and Co., Birmingham	2	2	0
Messrs. F. and C. Osler, Birmingham	5	5	0
The Proprietors of the *Birmingham Journal and Daily Post*	2	2	0
The Proprietors of the *Birmingham Gazette*	2	2	0
R. L. Chance, Birmingham	2	2	0
T. Avery, Birmingham	2	2	0
W. Tasks and Sons, Birmingham	2	2	0
W. Lucas Sargant, Birmingham	2	2	0
— Mountain (Messrs. Walter, May, and Co.), Birmingham	2	2	0
Decimus Burton, F.R.S.	1	0	0
W. Botly	1	1	0
Professor Robert Bentley	2	2	0
John Stuart Mill, M.P.	1	1	0
G. F. Wilson, F.R.S.	2	2	0
Henry Creed	1	1	0

A circular has been issued by the Birmingham Chamber of Commerce, "earnestly asking for the co-operation of manufacturers and others, believing it to be of the highest importance that the opportunity now afforded, by which the workmen of our town may be made acquainted with the productions of continental manufacturers, should not be lost," and inviting subscriptions.

SUBSCRIPTIONS.

The Lady-day subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

TREASURERS' STATEMENT OF RECEIPTS, PAYMENTS, AND EXPENDITURE, FOR THE YEAR ENDING 31ST MAY, 1867.

Dr.

	£ s. d.	£ s. d.
To Cash in hands of Coutts and Co., 31st May, 1866		639 17 6
To Subscriptions received during the year, from Members and Institutions in Union	5,563 18 6	
Life Contributions	378 0 0	
Donation by A. Davis, Esq. (2nd)	21 0 0	
		5,962 18 6
Interest on Deposit Note at the London and Westminster Bank		7 14 9
To Dividends on Stock:—		
Consols, £4,746 19s. 5d. 140 0 10		
,, North London Exhibition Trust, £167 7s. 3d. 4 19 8		
	144 19 6	
To New 3 per Cents.:—		
Dr. Fothergill's Trust, £388 1s. 4d.	11 9 0	
India 5 per Cent. Rupee Notes, 52,000 Rupees	244 8 10	
		400 17 4
To Examinations:—		
The Worshipful Company of Goldsmiths	10 0 0	
The Royal Horticultural Society	19 10 0	
The Rev. Dr. Temple	5 5 0	
Charles Brooke, Esq., F.R.S.	2 2 0	
Fees from Local Board Candidates, &c.	11 16 0	
		48 13 0
To Art Workmanship:—		
The Worshipful Company of Goldsmiths	15 0 0	
Do. do. do. Clothworkers	10 10 0	
Do. do. do. Plasterers	15 0 0	
Do. do. do. Salters	10 10 0	
Sale of Examples	14 3 0	
		65 3 0
To Sale of Books	2 5 0	
,, Jury Reports	2 2 0	
		4 7 0
To The Prince Consort's Prize		26 5 0
Artizans' Paris Visit Fund		62 14 0
South Australian Institute		350 0 0
Advance by Messrs. Coutts and Co.		650 0 0
		£8,218 10 1

Cr.

	£ s. d.	£ s. d.
By House and Premises:—		
Rent, Rates, and Taxes	166 14 1	
Insurance, Gas, Coals, and House Charges	205 3 0	
Repairs and Alterations	19 3 9	
		391 0 10
By Office:—		
Salaries, Wages, and Commissions	1,683 5 9	
Stationery and Printing	140 6 10	
Advertising	119 19 7	
Postage Stamps and Parcels	116 7 4	
		2,059 19 6
By *Journal*, including Stamps and Distribution to Members	1,828 3 1	
Library, Bookbinding, &c.	83 9 1	
Jury Reports on Exhibition of 1862	1 10 0	
Conversazione	192 3 3	
		2,105 5 5
By Union of Institutions, including Examination Prizes, Postage, Stationery, Printing, &c	705 1 1	
Art Workmanship Prizes	386 17 1	
Whitby Jet Prize	5 0 0	
International Horticultural Congress Prizes	16 0 0	
Society's Albert Memorial Medal	21 18 8	
,, Medals	10 2 6	
		1,144 19 4
By Committees:—		
Food	29 0 10	
Musical	39 6 6	
Artistic Copyright	6 7 9	
Trade Marks	1 12 0	
Memorial Tablets	3 5 3	
		79 12 4
By South Australian Institute	480 13 3	
Prince Consort's Prize	26 5 0	
North London Exhibition Prize	4 18 8	
Artizan's Paris Visit	27 0 6	
		538 17 5
By Cantor Lectures	170 8 0	
Annuity to Mrs. Cantor	25 0 0	
		195 8 0
By Invested in Purchase of £214 3s. 10d. Reduced 3 per Cent. Stock		200 0 0
By Repayment of Advance by Messrs. Coutts and Co.	650 0 0	
Interest on ditto	10 17 3	
		660 17 3
By Balance of Cash in hands of Messrs. Coutts and Co. 31st May	826 3 10	7,376 0 1
Ditto in hands of Secretary, Petty Cash	16 6 2	
		842 10 0
		£8,218 10 1

LIABILITIES AND ASSETS.

Dr.

	£ s. d.	£ s. d.
To Sundry Creditors:—		
South Australian Institute	63 18 3	
Sir W. C. Trevelyan, Bart.	70 0 0	
The Prince Consort's Prize	26 5 0	
North London Exhibition Trust	2 9 4	
Examination Prizes (Society's)	194 0 0	
,, Royal Horticultural Society's	24 0 0	
,, ,, Geographical ,,	5 0 0	
,, The Worshipful Company of		
,, ,, Goldsmiths	8 0 0	
,, ,, Coach and Coach Harness Makers	3 0 0	
,, *Gardeners' Chronicle*	3 0 0	
Examiners' Fees	240 9 0	
Harry Chester, Esq.	1 0 0	
Artizans' Paris Visit Fund	35 13 6	
Tradesmen's Accounts	705 5 2	
		1,382 0 3
* Excess of assets over liabilities		4,184 16 0
		£5,566 16 3

Cr.

	£ s. d.	£ s. d.
By Reduced 3 per Cent. Stock, £214 3s. 10d., at 93¼		199 14 8
Consols, £146 19s. 5d., at 95½		140 5 1
Invested in India 5 per Cent. Rupee Notes		353 11 6
Subscriptions due and in course of collection, £2,379 6s., ——— valued at		1,900 0 0
Barry's Pictures and other Property, do.		2,000 0 0
Prince Consort's Prize		26 5 0
Royal Horticultural Society		23 10 0
,, Geographical Society		5 0 0
The Worshipful Company of Coach and Coach Harness Makers		3 0 0
The *Gardeners' Chronicle*		3 0 0
Cash in hand of Messrs Coutts and Co.	826 3 10	
,, London and Westminster Bank	70 0 0	
,, in hand of Secretary, Petty Cash	16 6 2	
		912 10 0
		£5,566 16 3

* The above is exclusive of the value of the Society's lease of premises.

STOCK STANDING IN THE NAME OF THE SOCIETY AT THE BANK OF ENGLAND.

Consols	£4,914 6 8
New Three per Cents.	388 1 4
Reduced 3 per Cent.	214 3 10
India 5 per Cent. Rupee Notes	Rs. 52,000

TRUST FUNDS INCLUDED IN THE ABOVE.

Swiney Bequest	£4,500 0 0	Consols, chargeable with a sum of £200 once in five years.
John Stock's Trust	100 0 0	,, chargeable with the Award of a Medal.
North London Exhibition Trust	167 7 3	,, chargeable with the Award of the Interest as a Money Prize.
Fothergill's Trust	388 1 4	New 3 per cents., chargeable with the Award of a Medal.
Cantor Bequest	5,049 9 7	Invested in India 5 per cent. Rupee Notes, 52,000 rupees.

Society's House, Adelphi, 20th June, 1867.

PHILIP WRIGHT, } *Auditors.*
JOHN MURRAY, }
P. LE NEVE FOSTER, *Secretary.*

Financial Statement.

The foregoing statement is published in this week's *Journal*, in accordance with Sec. 42 of the Society's Bye-laws, which provides that, at the Annual General Meeting, the Council shall render to the Society a full account of their proceedings, and of the receipts, payments, and expenditure during the past year; and a copy of such statement shall be published in the *Journal* of the Society on the Friday before such general meeting.

Annual General Meeting.

The One Hundred and Thirteenth Annual General Meeting, for the purpose of receiving the Council's report and the Treasurers' statement of receipts, payments, and expenditure during the past year, and also for the election of officers, will be held, in accordance with the Bye-laws, on Wednesday next, the 26th of June, at four o'clock p.m.

The Council hereby convene a Special General Meeting of the members of the Society to ballot for members, such meeting to take place at the close of the Annual General Meeting.

By order,

P. Le Neve Foster, *Secretary*.

Society's House, Adelphi, June 19th, 1867.

Proceedings of the Society.

Sixteenth Annual Conference.

The Sixteenth annual Conference of the Representatives of the Institutions in Union, and the Local Educational Boards, with the Council of the Society, was held at the Society's House on Wednesday, the 19th inst., at 12 o'clock noon. The Right Hon. Henry Austin Bruce, M.P., presided.

The following is a list of the Institutions and Local Educational Boards represented at the Conference, with the names of their respective representatives :—

Banbury Mechanics' Institute	Mr. R. Heygate Brookes.
,, Local Board	Mr. J. H. Beale
Birmingham and Midland Institute	Mr. W. C. Aitken.
Bromsgrove Literary and Mechanics' Institute	Mr. H. F. Vernon, M.P. Mr. T. H. Gretton.
Carlisle Mechanics' Institute	Mr. E. Potter, M.P.
Chelmsford Literary and Mechanics' Institute	Mr. John Gibbs. Mr. Thomas Moss.
Colchester Literary Institute	Mr. C. H. Hawkins.
Dudley Mechanics' Institute	Mr. C. Twamley. Mr. E. Holbrey.
Glasgow Institution	Mr. Alexander Craig.
,, Mechanics' Institution	Mr. William Graham, M.P.
Hertford Local Board	Mr. R. Dimsdale, M.P.
Huddersfield Mechanics' Institute	Mr. John Sugden.
Hull Young People's Institution	Mr. Paul Blackmore.
Lancashire and Cheshire Union of Institutes	Mr. Alderman Rumney, F.C.S. Dr. R. M. Pankhurst. Dr. John Watts. Mr. Thomas Lawton.
Lancaster Mechanics' Institute	Mr. J. S. Harrison, J.P. Mr. E. Storey.
London, Birkbeck Literary and Scientific Institution	Mr. G. C. Sherrard. Mr. J. Rigby Smith.
,, City of London College	Rev. J. Maskell Mr. J. Knight Mr. J. H. Levy Mr. F. Reynolds.
,, Lambeth Local Board	Mr. T. E. Heller.
,, Metropolitan Association	Rev. John Oakley. Mr. Thos. Whittington.
,, Walworth Literary and Scientific Institution	Mr. R. Strong. Mr. F. Wood.
Macclesfield Useful Knowledge Society	Mr. W. Bullock.
New Swindon Mechanics' Institute	Mr. W. L. Fallows.
Ryde (Isle of Wight) Philosophical and Scientific Society	Rev. J. S. Barrow. Mr. Thomas Webster, Q.C., F.R.S.
South Staffordshire Association	Lord Lyttelton. Mr. J. N. Langley. Mr. F. Talbot.
West Riding Educational Board	Mr. H. H. Sales.
Woolwich Royal Laboratory Local Board	Mr. J. Anderson. Mr. George White.
Worcestershire Union of Institutes	Mr. F. Marcus.
Yorkshire Union of Institutes	Mr. James Hole.

The Conference was also attended by the following, amongst others :—

Mr. Harry Chester, Vice-President of the Society.
Mr. Benjamin Shaw, Member of Council.
Mr. G. F. Wilson, F.R.S., Member of Council.
Mr. E. C. Tufnell, Examiner in Domestic Economy.
Mr. John Sykes, Examiner in Mensuration.
Mr. F. S. Cary, Examiner in Freehand Drawing.
Professor Hughes, Examiner in Geography.
Mr. I. F. Iselin, Government Inspector of Science Schools.
Mr. B. Waterhouse Hawkins.

The Secretary read the following

Report to the Council of the Society for the Encouragement of Arts, Manufactures, and Commerce.

Gentlemen,—In presenting this year my report of the Proceedings of the Union of Institutions, I have the satisfaction of recording a very considerable increase in the number of those who have presented themselves at the Society's Final Examinations,—an increase especially noteworthy, inasmuch as last year I had to report a slight diminution as compared with the previous year, the first time since the establishment of the examinations that there had been any interruption in the regular annual increase that had been going on. The numbers examined this year have reached 1,439, whilst last year they only amounted to 1,096. In the previous year the number of those presenting themselves for examination was 1,199, still

largely below the numbers of the present year. The number of those who have successfully passed the examination has been 1,120 in the present year, as compared with 839 last year, a somewhat larger proportion, inasmuch as the percentage of those not passed is this year only 21·3, whilst last year it was 23·5. Neither of these years, however, compares favourably in this respect with the year previous, 1865, when the percentage of not passed candidates was only 16·6. These fluctuations, whether as regards the number of those examined, or the proportion of those who are successful, cannot be readily accounted for, though no doubt the increase in the numbers examined is due in a considerable degree to the continued working of the Visiting Officers in their several districts. It is certainly very desirable that the number of these District Unions should be increased, and it will be seen that the question, "Whether any additional means can be devised to induce the Institutions to form District Unions, with paid Visiting Officers, in connexion with the Society of Arts?" is to come on for discussion at the Conference.

The reports of these officers, showing what has been done in their respective districts, are given at length in the Appendix.

Notwithstanding that this year the percentage of unsuccessful candidates has somewhat diminished as compared with last year, it still remains larger than it ought to be, especially when we bear in mind that only three years ago the percentage was considerably less, as the figures given above show. This is a matter which the Local Boards should seriously take into consideration, as with them rests the responsibility of admitting the candidates to the examinations. If the Boards are lax in this respect, unnecessary disappointment falls upon the candidates and discouragement ensues. I am well aware that I am repeating what I have said on this subject on former occasions, but I feel so strongly the importance of a strict attention on the part of the Local Boards to this portion of their duty that I think I am not over-stepping my province in calling the attention of the Boards to this matter so long as the proportion of unsuccessful candidates still remains so large. On the other side, it is but fair to the candidates generally, and to the character of the examinations as a whole, that I should state that in the opinion of the examiners the work is well done, and in many of the subjects they speak in the highest terms of the qualifications of the candidates.

The remarks of the examiners will be found in the appendix annexed to this report.

The following tabular statement shows the comparison of the present year's examinations, in its various details, with that of the two previous years:—

	1867.	1866.	1865.
No. of Local Boards at which Final Examinations were held	120	99	100
„ Candidates examined	1,439	1,097	1,199
„ „ passed	1,120	839	999
„ „ unsuccessful	319	257	200
„ Papers worked	2,050	1,571	1,744
„ 1st class certificates	339	203	315
„ 2nd class certificates	515	421	519
„ 3rd class certificates	664	520	517
„ unsuccessful papers	532	427	393
„ Prizes awarded	61	51	51
Prizes in amount	£266 5s.	£230 5s.	£211 5s.

I have taken the two previous years' returns rather than the last year only, because, as I have said before, a comparison with that year only would not have fairly represented the progress which these examinations are making.

The Prince Consort's prize is this year taken by William Meadows, aged 19, of the City of London College, clerk, who in this and the three preceding years has obtained the following first-class certificates:—

1864. Chemistry—First-class Certificate, with First Prize.
„ Animal Physiology—First-class Certificate, with First Prize.
„ Geometry—First-class Certificate, with First Prize.
1865. Book-keeping—First-class Certificate.
1866. Navigation and Nautical Astonomy—First-class Certificate, with First Prize.
„ Principles of Mechanics—First-class Certificate, with First Prize.
„ Algebra—First-class Certificate.
1867. Arithmetic—First-class Certificate, with Second Prize.
„ Domestic Economy—First-class Certificate, with First Prize.
„ English Literature—First-class Certificate, with First Prize.
„ Mensuration—First-class Certificate, with First Prize.

The special prizes offered by the Royal Horticultural Society for gardeners, by the proprietors of the *Gardeners' Chronicle*, by the Royal Geographical Society, by the Worshipful Company of Coach and Coach Harness Makers, and by the Worshipful Company of Goldsmiths, have, with two exceptions, been taken. The particulars have already been published in the *Journal*.

In compliance with the wish expressed at the last Conference, the Society of Arts offered special prizes to females in sixteen subjects, and though I regret to say that only two of these prizes were taken, the offer appears to have been productive of good effect, inasmuch as there has been a considerable increase in the number of Female Candidates; 64 having offered themselves for examination, and 57 having obtained certificates.

In the Elementary Examinations held by such of the District Unions and Local Educational

Boards as have availed themselves of the elementary papers issued by the Society, the certificates being awarded by the local authorities themselves, there has been likewise a very considerable increase in the number of candidates of both grades. Although, as I mentioned in my report last year, the fact of these elementary papers as well as the forms of certificate being supplied by the Society of Arts led, in some instances, to the erroneous impression that the examinations were held and the certificates awarded by the Society's own examiners,—an error which, if it ever became very prevalent, must lead to the total discontinuance of the aid thus afforded by the Society to elementary education,—the Council decided to continue it this year, and the results have, I think, fully justified this course, the increase in the number of candidates being so considerable that it would be a matter of regret that any circumstances should render it necessary to withdraw the assistance thus given to local effort. The results of this year's Elementary Examinations are given in the following table :—

ELEMENTARY EXAMINATIONS, 1867.

Name of Union or Local Board.	Number of Centres.	HIGHER GRADE.				LOWER GRADE.			
		Male Candidates.		Female Candidates.		Male Candidates.		Female Candidates.	
		Examined.	Passed.	Examined.	Passed.	Examined.	Passed.	Examined.	Passed.
Aldershot and Farnham District	2	16	11	1	..	14	12	6	3
Bessbrook (Newry)	1	..	..	..	..	1	1	..	..
Bodmin	1	7	6	..	..	..	..	..	..
Canterbury	1	1	1	..	..	..	..	..	..
Christchurch	1	9	6	2	2	22	13	29	20
Hertford	1	4	4	..	..	26	24	..	..
Hastings and St. Leonard's	1	4	3	..	..	1	..	..	..
Ipswich	1	6	6	..	..	..	..	..	..
Kent Association of Institutes	5	28	26	3	3	63	50	7	7
Lancashire and Cheshire Union of Institutes	47	240	130	..	..	765	253	185	95
Lichfield	1	..	..	..	..	20	11	..	..
Metropolitan Association	10	72	52	18	11	225	130	57	29
New Swindon	1	10	9	10	10	28	20	..	..
Plymouth	1	6	6	..	..	..	..	..	..
South Staffordshire Association	10	81	40	2	1	223	85	53	20
West Riding Educational Board	18	85	37	9	4	341	137	51	36
Whitby	1	2	2	..	..	..	..	..	..
Worcestershire Union	10	30	22	..	..	66	35	25	20
Totals	113	601	361	45	31	1795	771	413	230

It appears, then, that in 1866, these examinations were held by 21 District Unions or Boards at 112 centres; this year, 19 District Unions or Boards have held them at 113 centres. In 1866, there were 1,814 candidates, of whom 1,006 obtained certificates. Of these, 442 were candidates in the higher grade, of whom 260 obtained certificates; 1,372 in the lower grade, of whom 746 obtained certificates; this year the whole number of candidates examined was 2,854, of whom, however, only 1,393 obtained certificates, the proportions being 646 higher grade, with 392 successful; and 2,208 lower grade, with 1,001 successful, a smaller per-centage than last year. Among the higher grade candidates were 45 females, obtaining 31 certificates; and among the lower grade were 413 females, with 230 successful; while, last year, there were in the higher grade 18 females, 9 of whom were successful; in the lower grade, 273 females, with 128 successful.

These numbers include the candidates examined by the Metropolitan Association for Promoting the Education of Adults—a body formed only a few years ago, but which is, I think, steadily increasing in usefulness and advancing in public estimation. This Association preferred, as on former occasions, to use elementary papers prepared by their own examiners, but essentially similar to those issued by the Society. In their elementary examinations the above table shows that there has been a very considerable advance upon last year. In 1866, the candidates examined by this Association were as follows :—In the higher grade 37 male and 20 female candidates, of whom 13 and 14 respectively obtained certificates; in the lower grade 251 male and 57 female candidates, the certificates awarded being 150 to the former and 32 to the latter. The numbers this year, as given in the table, show a very considerable increase; they are —Higher grade, 72 male and 18 female candidates, of whom 52 and 11 respectively received certificates; in the lower grade, 255

male and 57 female candidates, the certificates awarded being 130 to the former and 29 to the latter. This Association also holds a special examination in needlework, and out of 60 candidates who came up to be examined in that subject, 33 obtained certificates. The increase in the number of candidates for examination in religious knowledge, held by this Association under the auspices of the Bishops of London and Winchester, shows that the appreciation of this subject is gaining ground; 18 male and 3 female candidates were examined in the higher grade, the certificates awarded being 12 and 3; and 81 male and 11 female in the lower grade, the certificates being 59 and 7. Besides the subjects already referred to, this Association holds examinations of its own in Domestic Economy, which, as stated in its programme, may be regarded as preparatory to those of the Society of Arts. In this subject it appears that there were 6 candidates examined, all of whom obtained certificates.

I must repeat what I have said on former occasions, that the numbers given in the above table, large as they are, inadequately represent the amount of encouragement really afforded to the progress of elementary education by the various Local Boards and Institutions connected with the Society. A considerable number of them prefer adopting systems of elementary examinations of their own, as to the results of which I am naturally to a considerable extent without information, but, however useful such examinations may be, the advantage of that approximation to uniformity which would be obtained if the same papers were used all over the country can hardly be doubted.

I may be permitted to say one word as to the valuable results that are likely to be effected by the co-operation of other societies, and also of those influential and important bodies, the City Companies, with the Society of Arts, in promoting the progress of education.

It will be seen by reference to the Programme of Examinations, that these bodies have in most instances offered prizes to special classes of persons, such as gardeners, coach-makers, and workers in the precious metals, for distinction in branches of knowledge connected with their particular callings. In these days, when the state of many English industries, as represented at the Paris Exhibition, shows (according to some high authorities) that the want of technical instruction among the higher classes of our artizans is beginning to be seriously felt, it is to be hoped that, if this co-operation were more widely extended, and each of the great City Companies induced to offer prizes of a similar character, some step, however small, might be made towards supplying this want. The subject,—"Whether, considering the valuable results of the co-operation which the Royal Horticultural and Geographical Societies, and certain public companies, have afforded to the Society of Arts in extending the sphere of its examinations, the like co-operation cannot be obtained from other societies and companies," will be brought forward for discussion at the Conference, and I have therefore thought that a few words from me upon it would not be out of place.

With reference to the state of the Institutions generally, although the reports for the present year do not, as a rule, show any very great advance in the amount of public support received by them, there is not, I think, on this head any cause for discouragement. One feature, however, I may notice, and that is that the tendency in some districts to make these Institutions places rather for amusement than for study, seems certainly to be increasing. At the same time I am bound to state that a large number of classes for systematic instruction in various branches of learning are established in many of the Institutions, and under the care of the visiting officers their number has increased.

Upon the whole, although the Society's Union of Institutions does not increase in numbers, I think I may fairly congratulate the Council on the results of the efforts made by the Society, within its own sphere, to benefit the Institutions connected with it, and to advance the cause of education.

Appendix.

Mr. Lawton, of the Union of Lancashire and Cheshire Institutes, writes:—

The following statistics show some of the results of the operations of the Union for the year 1866-7:—

	1866.	1867.
Total number of elementary certificates awarded—(Higher Grade)	73	130
„ „ (Lower Grade)	300	348
Number of Society of Arts' certificates awarded	270	384
Elementary certificates awarded to females	44	95
Society of Arts' certificates „ „	—	13
Institutes with Government Science Classes	33	41
Increase of Institutes in Union with the Society of Arts having Local Boards for superintendence of Examinations	—	7

602 Lower Grade candidates failed at the Elementary Examinations in February last; 459 of these had attended day schools for an average of 5·5 years, and had left school for not more than an average of 2·8 years. The results of the Government Science Examinations in May last are not yet published. Last year 184 certificates and 449 4th and 5th classes were awarded; 304 of these were obtained by three Institutes, which, in the same year, only received 87 certificates from the Society of Arts. One great obstacle to the progress of the Society's scheme of examination is the fact that so few can pass the Previous Elementary test. The Government Science Examinations are not guarded by any Preliminary Examinations, and it frequently happens that candidates at these examinations have the greatest difficulty in filling up the simple forms attached to the examination papers. Partly to induce and

encourage the adult operatives to give attention to the important matters Writing and Composition, the Council of the Union have instituted a system of special prizes, for essays, &c., on subjects in which the working classes are supposed to be interested. Essays have this year been written on the "Wages Question," "Cooperation," "Improvements in Machinery, &c." Special prizes are offered to the two candidates who this year shall obtain the highest aggregate number of marks at the Society's Examination. The Council propose for next year to distribute the subjects in the programmes of the Society and of the Science Department into ten groups, and award money prizes to candidates obtaining the greatest number of marks in each group. The Chairman of the Council (Mr. Alderman Rumney) has kindly consented to award a scholarship of £50 per annum, tenable for three years, in Owen's College, Manchester, to the artizan who, in 1869 and the two years immediately preceding it, shall obtain the highest aggregate number of marks at the examination held under the auspices of the Union. It is gratifying to report a considerable increase in the number and efficiency of Evening Classes for Females; and this increase is, to some extent, attributable to the special prizes offered to female candidates for "cutting-out and needlework." No candidate is allowed to compete for the prizes unless she has passed the Elementary Examination. During the past winter I have inspected the Evening Classes of 61 Institutes, delivered 30 addresses at public meetings, and attended 20 meetings of committees.

Mr. W. G. Larkins, of the Metropolitan Association for Promoting the Education of Adults, writes:—

The candidates examined in the Elementary Examinations this year have come from 35 Institutions. While the return shows an increase in the number of candidates, it also shows a decrease in the number of certificates granted. This is owing to the fact that a great many candidates did not take up the extra subject required in which they must pass in order to obtain a certificate. So far as they were examined, they showed considerable merit. Some, again, while they passed in perhaps two extra subjects, did not take up arithmetic, which is also compulsory. The examiners report that the papers sent in are on the whole satisfactory, especially in the higher grade. From a personal canvass of most of the Institutions, Night Schools, Working Men's Clubs, &c., I can but be of the opinion that the Elementary Examinations are appreciated, and their advantages acknowledged. There is, however, a feeling that the step between the Elementary Examinations and the Final Examinations is too great. There are many who can satisfactorily pass the higher grade examinations of the Metropolitan Association, but who are not sufficiently advanced to proceed to the further examination of the Society of Arts. This might possibly be remedied either by the establishment of a lower grade by the Society of Arts, or by the Metropolitan Association forming a yet higher grade than it now has. Another reason why there are so few candidates who come up to the Final Examination from the Elementary may be found in the fact that few of the Institutions afford facilities for the instruction of candidates in the many subjects in which the Final Examinations are held. The Elementary Examination requires a tolerable knowledge of arithmetic, with English history or geography, and a candidate obtaining a certificate has enough knowledge of each for all practical purposes. He feels that he will obtain no benefit by a further examination in them; his studies have not embraced any other subjects in which to be examined. This, of course, applies more particularly to night-schools, working men's, and, in general, evening classes. In some of the higher-class Institutions, of course, greater facilities for instruction exist, and members can qualify themselves for the examinations. Taking office only at the close of last year, I have had barely time to make myself acquainted with the details of the work of the Society of Arts. I may therefore be pardoned if I am unable to offer much in the way of suggestion or extension; I may, however, say that I have been greatly struck with the response that has been made to my endeavours thus far, especially where I have broken new ground.

Mr. F. Marcus, of the Worcestershire Union of Educational Institutes, writes:—

The work of the Union has made steady progress during the past year. There has been an increase in the number of institutes and night-schools in union; the number of artisan members and scholars in evening classes is also greater than last year. The candidates for Elementary and Special Examinations and for those connected with the Society of Arts, have increased from 591 to 904. Considerable additions have been made to the list of subjects for the Union special examinations, the prizes offered for needlework and domestic economy being amongst the most successful. The increase in the number of candidates for the Society of Arts' Final examinations is the most gratifying feature, as the certificates obtained are satisfactory assurances of real intellectual work and acquirements, and are, as such, valued by the recipients. The great drawbacks are, the very low state of the funds of the Union, and the little real inclination manifested by the managers of many institutions to make them subservient to the educational wants of the adult artisan population of the special locality.

Mr. H. H. Sales, of the Yorkshire Union of Institutions, writes:—

Increasing activity in the educational classes of Mechanics' Institutions, and greater earnestness and zeal on the part of the managers, mark our work in this Union at the present time. Systematic instruction, stimulated and encouraged by our various examinations and prize schemes, is becoming general throughout the Union, and good results are already seen, in a larger and more regular attendance of members. The Examinations of the Society of Arts are in every way adapted to the class-work of Institutions, and are welcomed by all engaged in adult education. Years must, however, pass away before the number of candidates will be largely increased, not from any defect in the scheme, but in consequence of the lamentably low standard of the great majority of the manual labour population. It matters little what may be the statistical returns respecting the state of education, for one fact cannot be disputed. The small success of our Institutions, compared with what might be gained, is mainly due to the defective education of the class members, who, having had but scanty, soon-forgotten instruction in the primary school, have, under all the difficulties attendant upon study after the work-day is past, to commence in the Institute the alphabet of knowledge. Practical men will not quibble concerning the exact number of thousands of uneducated children and youths in our midst, but will acknowledge the existence of a huge mass of ignorance in every seat of industry, which must be removed before larger results can be gained in our Institutions. The attention of the Union has long been prominently directed to the Paris Exhibition in relation to industrial instruction in Mechanics' Institutions. Whether English manufactures—the produce of English skill—are or are not superior to foreign workmanship, is within the region of controversy, but that instruction in industrial science is of paramount importance to a manufacturing community is beyond question. This instruction, founded on a liberal national basis, has yet to be commenced. The operations of the Department of Science and Art have hindered rather than promoted this instruction. Tentative in their existence, ever variable in their regulations, frivolous and vexatious in the

manipulation of details, it is no matter of surprise that managers care not for an alliance. The returns of the last examination for the whole country, tabulated and issued by the West Riding Educational Board, will show, judging by those already issued, how impossible it is to maintain that the present science aid can in any, but the very smallest degree, affect the great and momentous question of industrial education. To the Society of Arts, established to promote manufactures equally with arts and science, standing aside from all political parties, departmental influence, and commercial rivalry, the managers of the Institutions in this Union look to take action in directing national attention to the consideration of industrial instruction as an important component of national education.

Mr. F. Talbot, of the South Staffordshire Association for the Promotion of Adult Education and Evening Schools, writes:—

"There are in Union with our Association 21 Institutions, 6 Working Men's Clubs, and 31 Evening Schools, and they are all, with one exception, connected with the populous iron and coal-producing district of South Staffordshire. With regard to our Evening Schools, our Union will do all in its power to make them efficient, both for the purpose of their primary object, the improvement of elementary education, and to make them useful for the promotion of secondary education. Already several of them are sending in candidates for the Society of Arts' examinations, and the number will go on increasing year by year. Next to the Evening Schools we have some promising Young Men's Associations. Hitherto these Associations have been merely meetings of young men for religious exercises, debates, &c., but our Union has been trying for some time to induce their promoters to give them a more distinct educational character, and to provide for their members some means of systematic study, by classes, books, and lectures. I have attended the meetings of about a dozen of these small Associations, and two of the most important of them, one in Bilston and one in Dudley, have applied for admission into the Union. Others will follow, and in three or four parishes some steps have been taken to organize Associations with Classes, for the especial purpose of preparing candidates for the Society of Arts' examinations. In the month of March an important meeting of representatives of Institutions was held in the Town-hall, Wolverhampton, under the presidency of Sir John Morris, the Mayor, when a very able address was given by Mr. R. Kettle, one of the County Court Judges of the district, explanatory of the objects and details of the examination scheme of the Society of Arts, and a series of resolutions, based upon the address, were unanimously and heartily carried. The objects of the meeting, and Mr. Kettle's address, were fully reported in the local papers, and did much good amongst the Young Men's Associations above referred to. Our Union will, I hope, arrange for two or three meetings similar to the above during the next winter. In the almost complete, but we may hope temporary, cessation of class teaching in Mechanics' Institutions, our present hope of progress in the matter of secondary education lies much in the movement which we may be able to communicate to these small Associations. I am glad to be able to report that the Handsworth Working Men's Club has sent in this year some candidates to the Society's examinations. This is the first instance of members of a Working Men's Club coming up for examination, and proves that whilst recreation is perhaps the chief aim of their promoters, intellectual advancement may be kept successfully in view at the same time. In September the Union will hold a special examination of candidates in Scripture, Political and Domestic Economy, Animal Physiology, and the Laws of Health. No candidate will be admitted who has not taken the first-grade certificate of the Union at some previous examination. The prizes range from £2 to 10s., and are offered by the Association, and by several noblemen and others, friends of the Association. Our Union will hold a meeting for Athletic Sports in Sandwell Park, in July. The object is to encourage boys to give a steady attendance at Evening Schools during the winter months, and no one will be allowed to compete for the prizes that will be offered, unless upon the production of a certificate stating that he has attended school a certain number of times, and that his character has been good. For the first time in the history of the Association, the Committee have arranged to hold, next autumn, an Industrial Exhibition of work done by scholars (both male and female), who have attended their respective schools with regularity, during the past winter. The Committee are looking forward with much interest to this effort to promote industrial education, especially in regard to its inventive and artistic developments; and for the especial encouragement of the productions that may be contributed by girls and young women, a committee of ladies is in course of formation. To promote the writing of essays by members of Institutions and Working Men's Clubs, the Committee have this year proposed three subjects with prizes. One subject is theological, one is social, and the third is industrial, and is thus stated in the programme, 'On the Proofs afforded by the International Exhibition at Paris of the Scientific and Artistic Education of the Workmen of Foreign Countries.' Of course the writers of this latter essay must be persons who will have visited the Exhibition. After a period of much pecuniary embarrassment, our Union is now free from debt, and the Committee are hopeful of being able to extend its usefulness, and to prove its adaptation to promote the best interests of all those Institutions whose object is the improvement of adult education."

EXAMINERS' REMARKS.

The Examiner in *Arithmetic* reports a marked improvement in the Arithmetical papers for this year. The work, as a whole, has been carefully done, and the details have been very fairly worked out.

The Examiners in *Book-keeping* says:—"There is a larger proportion of papers obtaining first-class certificates than in 1866, while the proportion of third-class certificates and papers not passed is also larger. The following percentages indicate the relative proportions of the several classes for the year 1867:—1st class certificates 20 per cent.; 2nd class certificates 36 per cent.; 3rd class certificates 38 per cent.; not passed 6 per cent."

The Examiner in *Algebra* says:—"Looking to the work produced this year, I am able to say that it is unusually good, and betokens a sterling advance in the ability and knowledge of the candidates. A large proportion have done the papers creditably, and a certain number have answered in a style and with a precision of thought and language which would do credit to a university class. The proportion of failures is rather below the average of last year." The Examiner then refers to the circumstance of some of the candidates in this subject having copied. This has been already alluded to in the *Journal*.

The Examiner in *Geometry* says:—"The papers generally are worked well, with a careful attention to the logical sequence; and the problems, being easy—and some not more than questions which would be likely to have been considered by students—have obtained a great many more answers than usual. I think there is decided progress."

The Examiner in *Mensuration* says:—"It will be observed that nearly three-fourths of the candidates have fallen below the second class; but I would remark that these have done the simple questions very fairly; two only, who obtained but 8 per cent. of the full marks, can

be said to have failed completely. Questions of the nature of a problem find in general but little favour, and are seldom attempted with success. There are, as usual, several cases in which the working ought to have had more explanation."

The Examiner in *Trigonometry* says:—"The quality of the answers in Trigonometry is improved. Some of the candidates write very creditable papers, though the number of candidates for examination is still very small."

The Examiner in *Conic Sections* says:—"There is a very marked and decided improvement in the quality of the answers given to the questions in Conics, both geometrical and analytical, in this examination. Not only are one or two papers remarkably good, and very creditable to the candidates, but the average level of the papers is much above that of late years. The marks which it has been my duty to return, support the opinion which I am glad to express so strongly; and I assure the Council that the result of the present year justifies the continuance by them of the subject of conics within the range of examination by the Society."

The Examiner in the *Principles of Mechanics* says:—"I am very glad indeed to be able to put so many into the first class. The papers, as a whole, are very creditable to the students who have worked them, and appear to give evidence that mathematical principles, as applied to mechanics, are better taught and more fully understood in our schools and institutions. Those who have failed to obtain the requisite marks have come to the examination, in most cases, quite unprepared, and will need a year's close study before they should present themselves again. The papers of the first-class are extremely satisfactory."

The Examiner in *Practical Mechanics* says:—"The number of candidates for certificates in this subject has been very much larger than upon any previous occasion. The papers have been extremely well done upon the whole, two certificates of the first class, and thirteen of the second class, having been awarded."

The Examiner in *Light and Heat* has this year to remark again the want of proper preparation with a great number of the candidates. It is only by continual exercise in writing out the answers to the questions which may be proposed, that any student can make the best use of his knowledge in the limited time allowed for examination, so as to give correct, complete, and yet condensed answers to all the questions which are set before him.

The Examiner in *Chemistry* says:—"Many of the papers leave a good deal to be desired in the way of accuracy. Teachers of chemistry are apt to include in their courses of instruction a wider range of facts than their pupils can thoroughly master. Each step in the study of the science ought to be firm and clear, and even the very first steps ought to be samples of accuracy and clearness."

The Examiner in *Animal Physiology* says:—"Some of the papers were exceedingly good; the writers had evidently studied and got to understand their subject. Many showed a very fair knowledge; but a large number of the candidates were more anxious to show that they had learned by heart a series of technical terms than to make it clear to the examiner that they really understood what they were writing about. There was too much book-work—too little reflection over what had been read. There were also many instances of bad spelling, not only of technical, but also of common words."

The Examiner in *Botany* says:—"Although I consider but one candidate deserving of a first-class certificate and two of a second, yet on the whole the returns are satisfactory. The answers, even amongst those not entitled to a certificate, are often intelligent, and promise very fairly in future examinations."

The Examiner in *Floriculture* says:—"On the whole the papers of the present year show an advance on those of 1866. There is, however, room for further improvement, and I can but repeat the recommendation made last year, namely, that candidates should, as a part of their studies, practice the writing out of short pithy remarks on each of the subjects set down in the programme, comparing their own remarks with the statements in the text books, and repeating this from time to time, cutting out all superfluous words, so that they may get the essential particulars well impressed on the memory, and at the same time acquire a clear and condensed style of writing."

The Examiner in *Fruit and Vegetable Culture* says:—"In the examination papers of this year I observe a marked improvement on those of last. There is in them none of that pretentious science that characterised some of those; but where scientific subjects are dealt with it is apparent that the writer has made them a subject of study, and has proved them in his practice. There is also less of mere book knowledge than I observed in last year's papers. Taking them altogether, they are very creditable, while those of the first class are highly meritorious."

The Examiner in *Domestic Economy* says:—"Most of the answers display a very creditable knowledge of the subject, but many of the candidates seem to know far more than they are able to put into good English, and show an extraordinary deficiency in the power of composition. Bad grammar, and the absence of stops, often make it difficult to comprehend the meaning intended to be conveyed. Altogether, however, the answers are satisfactory."

The Examiner in *Geography* says:—"There is little that calls for remark in reference to the Geography papers for the present year. Regarding them as a whole, they render obvious a large amount of preliminary work—much of it work that has evidently been well and thoughtfully done. It is true that the papers to which only third-class certificates can be awarded bear a large proportion to the whole, but, considering the limited opportunities for study which may probably be assumed to have been at the disposal of many of the writers, there is no reason either for surprise or dissatisfaction at such a result. In the case of many among these (and in some of those that come under the head of 'not passed') there are evidences of the ability to do more with longer and better preparation. It cannot be too strongly impressed on intending candidates, that methodised study (as distinguished from merely desultory snatches at knowledge) is a condition indispensable to a high order of success. The first-class papers of the present year do very great credit to their writers."

The Examiner in *English History* says—"I think that upon the whole the answers that I have received to the questions are more satisfactory than those of last year, and show a decided improvement, not only in the general knowledge of the candidates, but in the care with which they have studied the special subjects of the examination."

The Examiner in *English Literature* says:—"A large proportion of the papers are very satisfactory. On the whole they are certainly better than the papers of last year. The one to which I have given the highest number of marks has remarkable merit, and perhaps deserves to stand at a greater distance above the one that comes next to it than the mere number of marks would indicate. I regret to observe that, in spite of the repeated admonitions that have been given, there are some candidates who waste their time by copying out the questions on their papers."

The Examiner in *Logic and Mental Science* says:—"The number of candidates in this department is not equal to the two preceding years, but the quality of the work is very decidedly better. In Logic and Mental Philosophy the answers are generally good. The paper on Moral Philosophy has not been attempted."

The Examiner in *Latin and Roman History* says:—"The work of the best candidate is as good as I have ever had; the work of the worst is much above the worst

TABLE I.

RESULTS OF THE FINAL EXAMINATION OF 1867.

NAME OF LOCAL BOARD.	No. of Candidates Examined at Previous Examination by Local Board.	No. of Candidates who Passed Previous Examination by Local Board.	No. of Candidates Examined at Final Examination.	No. of Candidates who Passed at Final Examination.	No. of Papers Worked at Final Examination.	No. of First-class Certificates awarded.	No. of Second-class Certificates awarded.	No. of Third-class Certificates awarded.	No. of Prizes awarded to Candidates.	No. of Unsuccessful Candidates.
Aberdeen	20	15	14	11	15	3	4	5	1	3
Accrington	...	...	2	2	3	...	1	2	...	...
Alderley Edge	8	3	5	4	13	1	2	5	...	1
Aldershot and Farnham	12	12	8	7	14	2	4	5	...	1
Ashford	7	7	11	10	12	4	2	5	...	1
Ashton-under-Lyne	5	5	7	6	10	...	2	4	...	1
Bacup	34	31	19	16	26	3	2	14	...	3
Belfast (People's Literary Institute)	8	8	7	7	8	...	1	6	...	...
,, (Science School)	51	51	33	26	75	16	22	15	4	7
Bessbrook (Ireland)	1	1	2	2	3	2	1	...	...	...
Bilston	...	...	2	2	4	1	...	3	...	...
Birmingham and Midland Institutute	25	20	29	26	33	3	9	14	...	3
Blackburn	...	...	5	5	11	1	3	5	...	...
Blandford	...	...	1	1	1	...	...	1	...	...
Bodmin	7	6	6	4	7	1	1	3	...	2
Bollington	2	2	2	2	2	1	...	1	...	...
Bolton (Mechanics' Institution)	13	13	13	7	15	...	4	3	...	6
,, (Science School)	...	...	18	7	29	1	4	12	...	11
Bradford	19	15	19	13	29	1	4	12	...	6
Bristol	65	47	29	25	30	3	11	12	...	4
Bromley (Kent)	...	...	1	1	2	1	...	...	2	...
Burnley	...	...	16	11	20	4	3	7	...	5
Burrage-road (Plumstead) Evening Classes	76	73	45	30	45	1	17	12	...	15
Bury (Lancashire)	18	18	15	8	22	...	3	5	...	7
Carlisle (Lord-street Reading-rooms)	6	6	3	2	6	2	2	...	...	1
,, (Mechanics' Institute)	2	2	4	4	9	2	5	2	...	...
Chatham, &c.	2	2	3	3	6	5	1	..	1	...
Chelmsford	11	11	12	7	12	...	2	5	1	5
Chorley	8	8	8	4	17	2	2	4	...	4
Christchurch	1	1	5	3	8	3	...	3	...	2
Clitheroe	13	4	5	1	5	...	1	...	...	4
Crewe	12	12	6	4	15	1	1	6	...	2
Dean Mills	2	2	2	1	2	...	...	1	...	1
Deptford	8	8	8	5	13	4	...	2	2	3
Derby	4	4	5	5	11	6	4	1	...	...
Devonport	7	7	24	23	48	11	23	7	2	1
Droylesden	50	46	18	11	25	3	5	10	...	7
Dudley	11	11	4	3	5	...	1	3	...	1
Ebley	2	2	2	2	2	..	2	...	...	...
Eccleshill	1	1	1	1	1	...	...	1	...	...
Edinburgh	19	18	12	9	14	1	4	5	...	3
Faversham	2	2	2	2	4	...	3	1	...	...
Freetown (Glossop)	6	6	6	6	6	1	1	4	...	...
Galgate	2	2	2	...	2	...	...	...	...	2
Gilford (Ireland)	2	2	5	5	8	1	...	7	...	...
Glasgow (Anderson. Univ. Pop. Evg. Classes)	66	53	45	41	52	6	15	24	1	4
,, (Athenæum)	42	38	37	33	45	10	16	14	3	4
,, (Institution)	22	21	11	9	13	2	4	5	...	2
,, (Mechanics' Institution)	46	42	37	28	43	10	9	12	...	9
Guisborough	2	2	2	2	2	...	1	1	...	...
Halifax (Mechanics' Institution)	17	17	11	8	14	2	2	5	...	3
,, (Working Men's College)	20	17	24	22	33	9	13	7	2	2
Handsworth	8	8	6	3	9	...	1	2	...	3
Haslingden	...	...	3	2	8	1	...	2	...	1
Hastings and St. Leonard's	3	3	5	4	8	...	4	2	...	1
Hertford	...	...	1	1	1	...	...	1	...	...
Heywood	...	...	9	2	9	...	1	1	..	7
Huddersfield	12	12	12	8	19	1	5	4	1	4
Hull	8	7	8	6	8	1	2	3	...	2
Hyde	20	20	14	7	18	1	1	7	...	7
Ipswich	16	16	15	14	19	4	7	5	...	1
Kidderminster	2	2	2	2	3	1	1	1	...	...
King's Lynn	5	5	5	5	5	3	2	...	...	...
Kinver	4	4	4	3	4	...	2	1	...	1
Leeds (Church of England Institute)	16	16	6	6	8	3	2	3	1	...
,, (Mechanics' Institution)	15	15	25	16	41	7	6	14	1	9
,, (Young Men's Christian Association	4	4	10	10	13	4	3	6	...	...
Lichfield	7	7	12	8	15	1	5	5	...	4
Liverpool Institute	12	12	18	17	28	6	4	12	...	1
Lomeshaye	20	18	15	4	15	...	...	4	...	11
London (City of London College)	44	37	57	54	84	33	31	14	11	3
,, (Lambeth Evening Classes	20	16	9	7	13	...	3	7	...	2
,, (Mechanics' Institution)	36	35	43	38	64	15	17	24	2	5
,, (Royal Polytechnic Institution)	48	48	46	41	78	15	16	31	5	5
,, (St. Stephen's, Westminster)	4	4	8	6	13	2	5	4	...	2
,, (St. Thomas Charterhouse)	1	1	1	1	3	...	2	1	...	...
Louth	3	3	3	3	3	...	1	2	...	...
Macclesfield	2	2	2	1	3	1	...	...	...	1
Malvern	...	...	3	3	4	...	2	2	...	...
Manchester (Mechanics' Institution)	58	52	59	56	83	21	31	26	1	3
Mossley	8	8	9	9	9	...	1	8	...	...

TABLE I.—(CONTINUED.)

NAME OF LOCAL BOARD.	No. of Candidates Examined at Previous Examination by Local Board.	No. of Candidates who Passed Previous Examination by Local Board.	No. of Candidates Examined at Final Examination.	No. of Candidates who Passed at Final Examination.	No. of Papers Worked at Final Examination.	No. of First-class Certificates awarded.	No. of Second-class Certificates awarded.	No. of Third-class Certificates awarded.	No. of Prizes awarded to Candidates.	No. of Unsuccessful Candidates.
New Mills	4	4	6	1	8	...	...	1	...	5
New Swindon	69	22	12	9	15	5	...	4	...	3
Newton Heath	...	...	3	3	3	...	1	2	...	...
Oldbury	3	3	3	3	3	1	...	2	...	...
Oldham (Lyceum)	34	30	44	32	57	4	10	26	...	12
Padiham	...	...	3	1	3	...	...	1	...	2
Paisley	33	33	17	15	18	1	10	5	...	2
Pembroke Dock	6	6	4	4	8	3	3	2	1	...
Pendleton	...	...	2	2	4	...	1	3	...	...
Plymouth	6	6	2	2	2	...	...	2	...	...
Portsmouth	9	9	11	11	30	11	12	7	3	...
Preston	21	21	16	13	23	2	9	4	...	3
Rawtenstall	21	21	9	4	9	1	...	3	...	5
Redditch	6	6	7	...	7	...	...	...	...	7
Richmond	5	5	6	6	17	2	12	1	...	...
Rugby	21	19	16	15	30	3	6	11	1	1
St. Helen's (Lancashire)	2	2	6	5	7	...	1	5	...	1
Salford	45	43	41	36	55	9	20	15	...	5
Scarborough	5	3	5	3	6	1	1	2	...	2
Slough	6	4	10	5	11	1	1	4	2	5
Smethwick	...	...	12	11	15	2	3	9	...	1
Southampton	10	9	23	22	44	13	11	13	5	1
Staleybridge	...	...	7	5	9	2	...	5	...	2
Stockport	17	17	23	12	28	4	3	7	...	11
Stocksbridge	4	4	3	2	6	...	...	3	...	1
Stourbridge (Church of England Institute)	4	4	5	3	7	...	1	2	...	2
Stroud	...	...	7	4	10	..	1	5	...	3
Tottington	...	...	3	2	5	...	1	1	...	1
Wakefield	4	4	4	2	7	3	1	1	...	2
Walsall	9	9	8	8	13	...	3	7	...	...
West Bromwich (Goldshill)	...	...	9	9	19	4	4	5	1	...
West Hartlepool	...	...	1	1	3	1	1	1	...	...
Whitby	2	2	2	1	3	...	1	...	...	1
Wolverhampton	2	2	13	13	27	6	10	10	1	...
Woolwich (Royal Arsenal)	28	28	26	13	40	3	3	11	...	13
,, (St. Thomas's Schools)	35	35	25	15	25	...	9	6	...	10
Worcester (Birdport Free Church Association)	...	...	3	3	7	3	1	2	...	...
,, (Catholic Institute)	2	2	3	3	4	1	2	1	...	...
York	25	19	16	7	22	2	2	6	...	9
Totals	1,576	1,401	1,439	1,120	2,050	339	515	664	61	319

Number of Local Boards, 120.

that I have ever had. The average is much as usual, except that the parsing is better."

The Examiner in *French* says:—"I am on the whole extremely satisfied with the papers this year, and am able to recommend no less than 91 candidates for certificates, a number much larger, not only absolutely speaking, but also in proportion to the total amount of papers received, than in any former year. This satisfactory result is, I think, mainly due to an improvement in the mode of working the papers. Too often, as I had occasion to remark in a former report, it seemed as if the candidates had imagined that their best chance of securing at least a second or third-class certificate was to aim anyhow at a first-class one; the almost invariable consequence in such cases being an utter failure. Now, I am glad to see that this year the scope of each paper is generally better defined and its aim less ambitious. The candidates have done all the better for Horace's precept:—

> Sumite materiam vestris, qui scribitis, æquam
> Viribus, et versate diu quid ferre recusent,
> Quid valeant humeri.

The Examiner in *German* says:—"I do not remember ever to have had before me such good German compositions as those written by the best candidates this year."

The Examiner in *Italian* regrets that only two candidates should have taken up this subject. He has only been able to award a second and third-class certificate.

The Examiner in *Spanish* says that he thinks on the whole there is a general improvement.

The Examiner in *Free-Hand Drawing* says:—"There were eighty-six candidates whose drawings were submitted to me at this examination, which is a greater number than has been sent up in any previous year. I have awarded six first-class certificates, twenty-two second-class, thirty-one third-class, and twenty-six have not passed. The drawings are quite up to the general average, but the candidates have sadly failed in answering the four questions relating to the proportions of the human figure, only one out of the eighty-six having answered them correctly."

The Examiner in *Geometrical Drawing* remarks that "About 31 per cent. of the candidates only have gained a first or second class, and no less than 40 per cent. have failed to pass. This is the result of the same causes which have been mentioned in previous reports—First, a want of elementary knowledge of practical co-ordinate geometry; and secondly, attempted constructions which the candidates should have felt were beyond their powers. It should be stated that there were thirty questions for the candidate to select from, without any restriction, and it was assumed that in the allotted time he could not construct more than ten, while the credits were assigned so that seven would have given him a first class. The drawing generally is very fair, and in many cases very good."

TABLE II.

NUMBER OF PAPERS WORKED IN EACH SUBJECT IN THE FOUR LAST YEARS; WITH THE RESULT FOR THE YEAR 1867.

SUBJECTS.	1864.	1865.	1866.	1867.				
				No. of Papers Worked.	No. of First-class Certificates.	No. of Second-class Certificates.	No. of Third-class Certificates.	No. of Papers in respect of which no Certificate was awarded.
Arithmetic	431	446	383	520	141	110	149	120
Book-keeping	210	275	209	235	47	85	89	14
Algebra	93	68	65	87	15	29	20	23
Geometry	35	26	30	41	2	7	22	10
Mensuration	50	43	48	55	3	11	15	26
Trigonometry	13	10	9	9	1	2	4	2
Conic Sections	1	1	7	8	4	4	..	..
Navigation, &c.	4	4	2	1	..	..	1	..
Principles of Mechanics	8	11	16	27	6	4	7	10
Practical Mechanics	14	15	18	38	2	13	8	15
Magnetism, Electricity, &c.	22	19	8	32	1	4	8	19
Light and Heat	..	7	7	35	1	4	7	26
Chemistry	99	107	80	76	5	13	30	28
Animal Physiology	42	84	48	45	3	9	19	14
Botany	8	12	19	16	1	2	4	9
Floriculture	..	..	6	9	2	4	2	1
Fruit and Vegetable Culture	..	..	8	9	2	5	1	1
Mining and Metallurgy	11	6	3	1	..	1	..	..
Political and Social Economy	1	5	6	8	1	1	4	2
Domestic Economy	10	13	6	34	19	5	5	5
Geography	88	87	86	98	11	30	39	18
English History	89	94	78	86	12	25	32	18
English Literature	26	30	39	29	7	12	8	2
Logic and Mental Science	9	15	8	4	..	3	1	..
Latin and Roman History	21	9	9	9	1	2	4	2
French	77	99	116	118	13	23	55	27
German	26	19	10	12	4	4	3	1
Italian	..	4	5	2	..	1	1	..
Spanish	..	10	6	6	1	3	1	1
Free-hand Drawing	50	56	55	85	6	22	31	26
Geometrical Drawing	66	128	132	240	16	59	72	93
Music	28	40	39	71	12	18	22	19
Totals	1,540	1,744	1,571	2,050	339	515	664	532

TABLE III.

This table shows the ages of the 1,693 candidates from whom return papers were received. Of these 1,439 underwent the final examination.

Age.	No. of Candidates.	Age.	No. of Candidates.
16	220	32	18
17	221	33	13
18	236	34	6
19	196	35	5
20	160	36	3
21	148	37	2
22	96	38	3
23	95	39	3
24	58	40	3
25	49	41	4
26	41	42	2
27	27	45	1
28	26	47	2
29	23	49	1
30	17		
31	14	Total	1,693

TABLE IV.

OCCUPATIONS, PRESENT OR PROPOSED, OF THE 1,693 CANDIDATES FROM WHOM RETURN PAPERS WERE RECEIVED:—

Accountants (and Clerks)	11	Block-maker	1
Agents	2	,, printer	1
Appraiser	1	Boiler-maker	1
Architects	6	Book-binders	4
,, and Builder's Clerks	2	,, keepers	38
Assistants, Building		,, sellers	5
,, Surveyor's	1	Boot-top manufacturer	1
,, Dispensary	2	Brass-finishers	2
,, Editor	1	,, founders	3
,, Newspaper-office	1	,, moulder	1
,, Observatory	1	,, turners	3
,, Photographic	2	Bricklayers	6
,, Surveyor's	2	Brickmaker	1
Art Student	1	Broker	1
Bandsman	1	Brushmaker	1
Blacksmiths	2	Builder	1
		Cabinet-makers	7
		Calenderer	1

Calico printer	1
Candlewick maker	1
Carpenters	28
Carriage-body maker	1
Carvers (in wood or stone)	3
Cashier	1
Chaser and embosser	1
Chemists	11
„ and Dentist	1
„ and Druggists	7
„ Photographic	1
Civil Engineers	13
Clerks—Banker's, Commercial, &c.	396
„ Carriers'	1
„ Civil Service	1
„ Colliery	2
„ Customs'	3
„ Engineers'	3
„ Foundry	1
„ in gas works	1
„ Insurance	2
„ Law, &c.	31
„ Ordnance Survey	2
„ Railway	25
„ Savings' Bank	1
„ Short-hand	1
„ Surveyors'	3
„ Telegraph	2
„ of Works	1
Clogger	1
Clothiers	3
Cloth-lapper	1
Coach-makers	4
„ painter	1
Cold-steel roller	1
Collectors (of Rates, &c.)	4
Colour-maker	1
Commercial Travellers	5
Compositors	4
Confectioners	2
Cordwainer	1
Cork-cutter	1
Correspondents	2
Cotton-broker	1
Creeler	1
Currier	1
Customs' Officer	1
Decorator	1
Dentists	3
Die-sinker	1
Dispenser	1
Domestic work	4
Drapers and assistants	14
Draughtsmen	15
Dressmakers	2
„ and milliners	2
Driller	1
Druggists	6
Drysalter	1
Dyers	8
Electro-gilder	1
Engine-fitters	20
„ smith	1
Engineers	92
„ mechanical	2
Engravers	5
Factory hands	6
Farmer	1
Farrier	1
Fitters	21
Flax-dressers	4
Fruiterer	1
Furrier	1
Gardeners	17
Gas-fitters	2
„ meter maker	1
Glass-engravers	2
„ painters	6
„ stainer	1
„ trade, in the	1
Glovers	2
Goldsmith	1
Governesses	7
Grocers and assistants	15
Inland Revenue Officer	1
Inspector of Waterworks	1
Ironmongers	5
Iron-moulders	3
„ refiner	1
„ turners	8
Jewellers	4
Joiners	37
Labourers	5
Lamp-makers	2
Land surveyor	1
Law writer	1
Letter carriers	2
Linen trade, in the	3
Lithographers	4
Lithographic draughtsman	1
„ printer	1
Locksmith and bell-hanger	1
Machine-fitter	1
Machinists	2
Maker-up	1
Manufacturers	3
Masons	3
Mathematical Instrument maker	1
Measurers	3
Mechanics	35
Medical profession	3
Merchant	1
Messengers	2
Metal dealer	1
Meter inspector	1
Millwrights	7
Minders	5
Monitor (paid)	1
Moulders	2
Needle finisher	1
News agent	1
Normal students	3
Office boys	6
Oil-cloth maker	1
Oilman	1
Oil and colourman	1
Opticians	3
Overlookers	9
Painters—House, &c.	9
Pattern card-maker	1
„ designer	1
„ makers	13
„ setter	1
Pavior	1
Pawnbrokers	3
Pearl box-maker	1
Photographers	2
Pianoforte maker	1
Piecers	10
Planer	1
Plasterers	2
Plumbers, &c.	2
Pocket-book maker	1
Pork-butcher	1
Porters	4
Post messengers	2
Preparing master (in a mill)	1
Printers	6
Provision dealer	1
Pupil teachers	32
Putter-out	1
Quarryman	1
Railway carriage builder	1
„ finisher	1
Refiner	1
Reporter	1
Roller coverers	2
„ turner	1
Rope-maker	1
Rural messenger	1
Saddlers	6
„ ironmonger	1
Salesmen	5
Schoolmasters	14
„ mistresses	2
Scorer	1
Sculptor	1
Seal-engraver	1
Sewing-machinist	1
Shawl-pattern designer	1
Ship joiner	1
Shipwrights	30
Shopmen	7
Silversmiths	2
Small-ware dealer	1
Smiths	5
Soldiers	4
Spinners	4
Staff-sergeants of militia	2
„ of police	1
Stationers	3
Stereotyper	1
Stock-keeper	1
„ takers	2
Stonemasons	5
Storekeepers	6
Stripper	1
Student of medicine	1
Surgeon	1
Tailors	9
Teachers	69
Telegraph messenger	1
Telegraphist	1
Time-keepers	4
Tin-plate workers	3
Tobacconists	3
Toolmakers	2
Turners	10
Twiners	2
Upholsterers	2
Wagon builder	1
Warehousemen and boys	65
Waste dealers	2
Watchmakers	4
Weavers	63
Wheelwrights	6
Whitesmiths	2
Winders	2
Wire-drawers	3
Wool-comber	1
„ sorters	5
Writers	5
Undetermined, or not given	67
Total	1,693

The report of the discussion will appear in next week's *Journal*.

PARIS EXHIBITION.

Continuing the subject mooted in the last number of the *Journal*, we may safely point to the collection of decorated glass on the British side of the Exhibition as furnishing another instance of decided progress. In ordinary table glass, and perhaps also in flint glass decorated in a simple manner, the English manufacturers cannot compete with those of France; the forms of the latter are extremely elegant, and the prices very moderate; it is in the most costly articles, and those in which the largest amount of art enters, that the British show is conspicuous. Some of the specimens exhibited are really elaborate works of art; and as examples of what may be done in the ornamentation of glass, some of these *tours de force* are certainly unequalled, and are destined to find their place in more than one public museum and private collection. The general progress shown in British decorated glass is certainly in keeping with that exhibited in the highly artistic objects referred to above; the forms as well as the "metal" are purer and more elegant than formerly, and the decorations are in better taste; the very general use of simple engraved leaves, flowers, ferns, and geometric forms, in place of the old-fashioned cutting, shows an improved taste and notion of fitness that should not be overlooked; they have called forth expressions of the highest admiration from our friendly rivals, who do not disguise their

surprise at the progress that has taken place in Great Britain in this manufacture since 1851. The great amount of skill exhibited in another branch of the glass trade has attracted almost as much attention, viz., the manufacture of what is called Venetian glass, in which the whole of the ornamentation is produced by the glass-maker himself, who turns it out from his hands completely finished. When it is remembered that the whole of the twists and waves which are the characteristics of Venetian glass are produced without the use of any mould, which would destroy the surface, and consequently, the pellucid character of the glass, and with no other aids than a few simple tools, and when we see the perfection of form and beautiful effects attained, the Venetian glass must be ranked very high as a product of pure industrial skill. There are specimens in the Exhibition which are not only full of grace in the design, but of which the forms are almost as perfect as if they had been turned on the wheel or moulded; and there are specimens which, for elaboration in the manufacture, can scarcely be surpassed.

In chandeliers and lustres the English manufacturers have formidable rivals, especially among the French makers, but, generally speaking, the forms are far lighter and more graceful than they were formerly; while the material, the cutting, and the modes of connecting the various parts are certainly also improved. The application of the Venetian glass to chandeliers and lustres, in imitation of an old style, also deserves notice, especially as regards construction and the skill of the glass worker.

The popularity of the Exhibition grows in the most remarkable manner; the number of visitors in a single day has probably already exceeded the expectations of the most sanguine; on Whit Monday, according to semi-official accounts, more than 120,000 persons paid for admission, and it is estimated that the total entries throughout the day must have amounted to 136,000. That a sum equal to £4,800 should be taken at the gates in one day, at this early part of the season, before the great mass of provincials and foreigners can leave home, is certainly an extraordinary fact; and it is highly satisfactory to note that not a single accident of any kind is recorded, and no special complaint heard of inconvenient crowding; this result must be attributed, in a great measure, to the large number of entrances, and, as we remarked last week, to the excellent means of ingress to the building itself.

The coming announcement of the awards is now looked forward to with great interest, and it is said that the list will be published in the last week of the present month.

On the 1st of July, at any rate, the awards will certainly be known, and the preparations for the grand ceremony of distribution are well advanced. It is announced that besides the Emperor and Empress of the French, there will be present on the occasion the Emperor and Empress of Austria, the Sultan and the Viceroy, now King of Egypt, the King and Queen of Portugal, the King of Sweden and Norway, the Prince of Wales, the Crown Prince and Princess of Prussia, and the representatives of the municipalities of London, Edinburgh, and Dublin. There are 16,000 numbered stalls in the Palais de l'Industrie, where the ceremony is to take place, which are reserved for the holders of season tickets, the price of which has just been reduced to sixty francs, whether for ladies or gentlemen. At the entrance of the sovereigns an unpublished hymn, by Rossini, will be performed by a powerful orchestra, with the aid of a large choir and military band. On the 4th of July will commence a series of grand concerts, festivals, and musical competitions in the same building.

Last week the word Vauxhall was used inadvertently in connexion with brown stone-ware. Messrs. Doulton and Watts alone represent the Surrey potteries, and their establishment is not in Vauxhall but in Lambeth adjoining.

Commerce.

SUGAR FROM STARCH.—"An interesting fact has been communicated to us," says the *Journal des Fabricants de Sucre*," by one of our correspondents in Canada, who, contrary to the results obtained in the United States, has effected at Montreal the complete conversion of the starch of maize and of cellulose into sugar. Little dextrine and strong crystals were obtained. There was a large quantity of this maize sugar manufactured at Mr. Molsen's refinery, in New York, last year, and crystallized with cane sugar, and delivered to the trade without any complaint, or the slightest suspicion that it partly consisted of sugars manufactured from cereals. A patent has been taken out in Canada, and another in the United States, and the inventor is actively engaged in following up this curious discovery, which, if successful, will add another to the different sources of sugar production." On this the *Produce Markets Review* observes, "It may be visionary on our part, but we cannot help thinking that the manufacture of crystallizable sugar from starch is one of the great chemical discoveries which will some day or other revolutionize commerce. We should then be dependent neither on the beet nor on the cane, but every country would be in a position to manufacture sugar from almost all vegetable products. The trade in potato or starch or glucose sugar is already a large one in Germany, and if the sugar could be crystallized its development would be vast."

Colonies.

SALMON IN AUSTRALIA.—The *Times* correspondent at Melbourne, in a recent letter, says:—"We have received from Dr. Officer, the Speaker of the Legislative Assembly of Tasmania, who takes the liveliest interest in the naturalization of useful animals in Australia, a letter informing us that he has himself seen a considerable number of salmon in the Upper Derwent, the fish having attained the grilse state of growth, and, obedient to their instinct, making for their native river, the Plenty. It would be difficult to give you any notion of the interest this subject has excited in the sister colony. I was on a visit there a few months back, at which time the intelligent portion of Tasmanian society were divided into two parties—those who expected and predicted, and those who did not expect, and, therefore, did not predict, that the salmon would return from the sea to the river in which they were hatched. They have returned, however, in force; and Mr. Frank Buckland may add this instance to his list, as the grandest achievement yet effected in the naturalization of fish among altogether new enemies, and exposed to other new conditions of existence."

HARVEST IN TASMANIA.—Tasmania, like the rest of the Australian colonies, has this year been blessed with an abundant harvest. It is stated that many farmers will have two or even three bushels of wheat where formerly they only got one. But the lowness of price of wheat this year is looked upon as a drawback, and the Victorians have imposed a duty of 9d. per cwt. on all grain, and 1s. per cwt. on all flour imported into that market. Of both these things the farmers complain greatly.

RAILWAYS IN NEW SOUTH WALES.—The Southern line is now the longest continuous railway in this colony, but it appears that, as in the mother country, extensions have not been followed by the anticipated increase of traffic, and, of course, therefore, the additional outlay has been, to a great extent, a dead investment, imposing annually an increasing burden on the revenue of the colony. The railways have not monopolised the traffic of the highway, and even if they had it seems doubtful whether the traffic would have yielded net profits enough

to pay a full dividend. It is remarkable how slightly the passenger traffic has increased with the extension of these railways. In 1861, 72 miles were open for traffic, and the number of passengers was very nearly 600,000. In 1864 there were 142 miles open, that is, nearly double the previous length, but the number of passengers only increased by one-sixth. The goods traffic in the same interval showed a far greater rapidity of increase; it was more than trebled, and not far from quadrupled.

Notes.

Aeronautical Experiments in France.—M. Camille Flammarion, who has undertaken the conduct of these experiments under the Scientific Commission, has made two ascents, in one case confining his observations to one zone, between 500 and 800 mètres in altitude, and in the other attaining the greatest possible height under the circumstances at daybreak. In the latter case, in order to avoid all extra weight, M. Flammarion recently ascended alone from Barbison, a village on the confines of the forest of Fontainebleau, at ten minutes to 4 a.m. At first the humidity caused the balloon to rise very slowly, but as the sun rose the ascensional power soon increased. The sky was perfectly clear, and in an hour the altitude attained was 1,000 mètres; at 5.30 it had risen to 2,000 mètres; at 6 to 2,400 mètres; at 6.45 to 3,000 mètres; at 6.47 to 10,000 feet. The difference in the amount of humidity in the air was very remarkable; at 120 mètres above the surface the hygrometer stood at 98°, whereas at the greatest altitude reached it only marked 25°. This excessive dryness, together with the rarefaction of the air, produced a painful sensation in the lungs and ears. The descent was made without the slightest accident.

Exhibition Excursions on the Continent.—The Eastern Railway Company of France and the directors of the German lines have made arrangements for a direct service, to carry passengers in one day between Paris and Frankfort-sur-Mein, by Metz, Forbach, Sarrebrück, Creuznach, and Mayence, without change of carriages. Monthly tickets will also be delivered for the same journey. This service will correspond at Mayence with the trains for Wiesbaden, and at Frankfort with those of Soden, Hombourg, and Nauheim.

Correspondence.

Porcelain.—Sir,—On my return from Paris my attention was directed to a remark in Mr. Chaffers's most interesting lecture, published in your *Journal* of 24th ult. At page 435 he says, referring to the Paris Exhibition, that only two manufacturers of porcelain have exhibited (Minton and Copeland). I beg to say that Worcester is also represented; but the specimens are so few that I can readily understand their being overlooked. Still, I believe these few pieces are of such a character as to uphold the reputation of the manufactory. They have already obtained high praise. It is with much diffidence that I offer an opinion which is at variance with one expressed by so experienced an adept as Mr. Chaffers, but I must protest against the porcelain recently exhibited at South Kensington, and called Lowestoft, being ascribed to any European manufactory. There are a few pieces in the cases which are undoubtedly Lowestoft, but they are very different from the great majority of the specimens. Mr. Chaffers is a high authority in porcelain fabrics, but, as a potter, I assert that the porcelain exhibited is Chinese, and the painting is Chinese also. The decoration of some Chinese porcelain tells us that it must have been imported in a white state and painted in various manufactories of England and the Continent. There are a few pieces of this character in the Lowestoft cabinet. In the Marquis D'Azeglio's collection at South Kensington, there is a tea or coffee set of Chinese porcelain with European painting. I have also sent from Worcester a Chinese cup and saucer with a Worcester print on it.—I am, &c., R. W. Binns.

Royal Porcelain Works, Worcester, June 18, 1867.

Flax Machinery.—Sir,—It was not until last week that a friend called my attention to your *Journal* of 29th March last, containing the report of a paper read by Mr. C. F. T. Young, on flax and its preparation, &c., in which there is a description of a flax-breaking machine, said to have been the invention of Mr. Brasier. This invention is mine, and was patented by me in 1862. The specification of my patent, dated 8th November, 1862, No. 3015, clearly shows this to be the case. Mr. Young, in his paper (page 296 of your *Journal* for March 29th), says: "The machine (Mr. Brasier's), as you will observe, consists of one large fluted cylinder, or roller, on which work four small rollers, also fluted, resembling somewhat in this respect the construction of the cotton carding engine." My provisional specification contains the following:—"My machine consists of a fluted roller, mounted on a frame or carriage; on the top of this roller I place one or more smaller rollers, either fluted or smooth." And my claim at the end of the complete specification contains the following words:—"What I claim is the use of an oscillating or rotary frame, carrying upon it one, two, or more rollers, which said rollers have a motion of rotation round their own axis," &c.; and the drawing shows the machine clearly to be the same as claimed by Mr. Brasier. My specification states that "The machine in Fig. 3 shows an application of the invention for the purpose of breaking and softening flax, hemp, grapes, or other vegetable fibres to be used for textile fabrics, by altering the surface of the rollers, or cylinders, so as to be either smooth, grooved, corrugated, serrated, or waved," &c. The only difference between Mr. Brasier's machine and mine is, that in the latter "two beaters" are added. For the last 20 years I have been engaged in India and this country in practically experimenting on flax, rheea grass, and other fibres, and my breaking machine has been proved to be the best ever invented. Permit me to add that the Mr. Brasier alluded to in the paper derived whatever knowledge he possesses of the machine from me. In the year 1863 he was in frequent communication with me, and certainly knew nothing of the machine then beyond what he gathered from me, whereas several machines were made for me in 1863 by Messrs. Fairbairn and Co., of Leeds, and sent to Calcutta for breaking Rheea and other fibres. I trust you will allow me to set myself right with the public, and to vindicate my claim to be the inventor of the fluted roller flax-breaking machine, described by Mr. Young as the invention of Mr. Brasier. I may add that this is the fifth flax-breaking machine I have invented and patented.—I am, &c., Henry Gardner.

13, Laurie-terrace, St. George's-road, Southwark.

MEETINGS FOR THE ENSUING WEEK.

Mon..... R. Geographical, 8½. 1. Rev. W. V. Lloyd, "Visit to the Russian Settlements on the Coast of Manchuria." 2. Gen. Sir A. Cotton, "On Communication between India and China by the line of the Burhampooter and Yang-tze-Kiang." 3. Dr. J. Lamprey, "A Journey to the N.W. of Pekin."
R. United Service Inst., 8½. Capt. C. H. Simpson, "A New Mode of Marine Propulsion."

Tues ...Medical and Chirurgical, 8½.
Ethnological, 8. 1. Sir Arthur Phayre, "On the Tenure and Distribution of Landed Property in Burma." 2. Mrs. Lynn Linton, "On Ethnography as illustrated by the Arts in the Paris Exhibition." 3. Mr. J. Crawfurd, "On the Antiquity of Man."

Wed ...Society of Arts, 4. Annual General Meeting.
R. Society of Literature, 4½.

Thur .. Royal Society Club, 6½. Annual Meeting.
Mathematical, 8.

Fri .....R. United Service Inst., 3. Col. A. H. Lane Fox, "Primitive Warfare," illustrated by specimens from the Museum of the Institution."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 7th June, 1867.

181. Bill—Real Estate Charges Act Amendment.
186. ,, Inclosure (No. 2).
187. ,, Local Government Supplemental (No. 3).
73. (VI.) Railway and Canal Bills—Seventh Report.
322. Valuation of Property Bill—Report of Select Committee.
328. Coal, Cinders, and Culm, &c.—Account.
Jamaica—Further Correspondence.

Delivered on 8th June, 1867.

178. Bill—Courts of Law Officers (Ireland) (amended).
185. ,, Public Records (Ireland) (amended).
189. ,, Turnpike Trusts (amended).
155. Superannuations (Public Offices)—Account.
339. East London Waterworks Company—Report.

Delivered on 12th June, 1867.

264. Wrecking in the Hebrides—Reports.
294. County Courts—Return.
299. Tamworth Charities—Return.
334. Clifton on Dunsmore Plot Rents Estate—Account.
342. Naval Savings Bank (The "Victoria")—Return.
344. Dublin Metropolitan Police—Abstract of Accounts.

Delivered on 13th June, 1867.

188. Bill—Railway and Joint-Stock Companies.
190. ,, Christ Church (Oxford) Ordinances.
191. ,, Local Government Supplemental (No. 4).
192. ,, Pier and Harbour Order Confirmation (No. 3).
196. ,, Contagious Diseases (Animals).
194. ,, Statute Law Revision.
217. (I.) Reformatory and Industrial Schools—Return.
293. Shannon and Suck Rivers—Corrected pages.
330. Army (Barrack Masters)—Return.
345. Fortifications—Account.
347. Army (Guns)—Return.
Public General Acts—Caps. 19 to 26.

Delivered on 14th June, 1867.

191. Bill—Local Government Supplemental (No. 4) (corrected copy).
321. Mines, &c., Assessment Bill—Special Report from the Select Committee.
The "Tornado"—Correspondence (Part VIII.).

Delivered on 15th June, 1867.

179. Bill—Public Health (Scotland) (amended).
260. Bengal Sanitary Commission—Second Report.
343. Gas Companies (Metropolis)—Accounts.
348. Succession Duty (Ireland)—Return.
349. Navy (Gun Vessels, &c.)—Return.
350. Merchant Seamen's Sixpences—Letter.
354. Metropolitan Gas Companies—Return.
361. Belfast Magistrates—Return.
364. Volunteers—Circular.

Delivered on 17th June, 1867.

195. Bill—Bridges (Ireland) (amended).
198. ,, Industrial and Provident Societies.
199. ,, Drainage and Improvement of Lands (Ireland) Supplemental.
78. (VII.) Committee of Selection—Eighth Report.
346. Merchant Service—Return.
351. Kitchen and Refreshment Rooms (House of Commons)—First Report.
358. Belfast Borough—Memorial.
Convict Discipline (Western Australia and Tasmania)—Annual Reports.

Delivered on 18th June, 1867.

156. Blackwater Bridge.
368. Counties and Divisions of Counties—Return.

Patents.

From Commissioners of Patents' Journal, June 14th.

GRANTS OF PROVISIONAL PROTECTION.

Apparatus for travelling through the atmosphere and on land and water—1525—J. M. Kaufmann.
Baths, marine—1450—G. F. Harrington.
Billiard tables—1440—A. V. Newton.
Boilers—1497—V. Barford and J. Skerman.
Boilers—1584—R. Pollit.
Boots and shoes—1545—G. M. Wells.
Calculating apparatus—1470—C. E. Brooman.
Cast steel, manufacturing—1549—C. Sanderson.
Castors—1519—J. Cartland and H. Bold.
Cutlery, sharpening—1491—A. M. Clark.
Engines and pumps—1529—E. W. Hughes and T. H. Head.
Fabrics—1501—J. Owens.
Fabrics—1555—A. M. Clark.
Fabrics, machinery for removing the card boards, &c., from the folds of—1430—J. C. Ellison.
Feed-water apparatus—1539—A. V. Newton.
Fire-arms, breech-loading—1446—C. Robert.
Fire-arms, breech-loading—1521—W. J. Murphy.
Flax, &c., cutting—1507—W. Nichols, J. Burnley, T. Wilson, and G. Jackson.
Fluids, measuring—1561—H. and H. Frost.
Food for sheep, &c.—1580—W. Mitchell.
Furnaces—1454—J. M. Stanley.
Furnaces—1495—J. G. Tongne.
Furnaces—1517—D. Adamson.
Furnaces—1537—C. E. Brooman.
Furnaces—1558—W. Dutton.
Furnaces—1559—W. P. Struvé.
Furnaces—1574—W. Coulson.
Gas blow pipes—1530—F. H. Johnson.
Granaries—1527—A. Martin.
Granite, &c., artificial—1458—P. M. Parsons.
Harvesting machines—1568—J. C. Mewburn.
Horses, feed bags for—1395—J. A. Knight and C. Bastand.
Liquids, injecting and ejecting—1513—A. Barclay.
Locomotives, tenders for—1347—G. Krauss.
Lubricators—1523—W. Brookes.
Malt, drying—1485—J. L. Norton.
Mowing machines—1499—W. M. Cranston.
Mustard, appliances for serving—1552—J. M. Napier.
Paraffin oil, &c., burning—1487—T. Metcalf.
Photographic pictures—1553—J. Simpson.
Pipes, coupling—1560—H. B. Barlow.
Pipes, seal or dip—1578—H. and F. C. Cockey.
Printing from plants, &c.—1432—H. C. Baildon.
Printing machines—1444—J. Harper.
Railway buffers—1543—C. Martin and J. Grint.
Railways—1442—G. Coles, J. A. Jaques, and J. A. Fanshawe.
Railways—1511—W. F. Henson.
Root-cutting machines—1535—E. Howell and T. Hardy.
Screw propellers—1567—W. H. Whettem and E. Walker.
Sewing machines—1551—G. T. Bousfield.
Ships, apparatus for indicating and registering the rise of water in the holds of—1239—M. A. F. Mennons.
Ships, &c., construction of—1434—F. Bonney.
Shoe for piles—1460—H. Hollingsworth.
Signals, &c., railway—1379—R. Andrew.
Spectacle frames—1541—H. Blackham.
Steam generators—1547—A. M. Clark.
Tea pots, &c.—1557—W. Ryland.
Telegraphic instruments, &c.—1531—M., R., and M. Theiler.
Telegraphs—1565—P. A. J. Dujardin.
Tobacco pipes—1456—F. P. Warren.
Tobacco pouches—1554—A. Oldroyd.
Tongs, submarine—1438—J. Johnson.
Trusses, &c.—1475—C. P. Button.
Tyres—1563—W. Affleck.
Washing and bleaching machines—1582—A. M. Clark.
Weights, raising heavy—1436—W. Clarke and E. Walker.
Wood, preparing, as a substitute for leather—1564—R. R. Knott and J. Jeyes.
Writing apparatus—1509—C. H. Thurnham.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Grain, weighing, &c.—1717—S. W. Wood.
Propellers—1697—H. Rolle.

PATENTS SEALED.

3258. E. S. Cathels.	3350. S. Belfield.
3293. F. W. Reeves and J. B. Muschamp.	3374. A. Shanks.
	3377. A. S. and H. H. Ayre.
3298. J. P. Gillard.	3390. R. Lewis.
3305. W. Campion.	3434. W. Clark.
3325. J. Macintosh.	3440. T. W. Plum.
3326. L. Schad.	99. W. Clark.
3330. T. Titterington.	273. T. Bullivant.
3332. S. Buxton.	403. W. Clark.
3344. W. E. Gedge.	883. E. B. Bigelow.
3346. T. and T. F. Walker.	971. F. Curtis.

From Commissioners of Patents' Journal, June 18th.

PATENTS SEALED.

3341. W. Gilbey.	3396. A. Mackie.
3343. W. Chapman.	3414. E. F. Göransson.
3356. R. L. Martin.	3451. J. and J. Miller.
3357. C. Lungley.	17. J. Cockshoot.
3363. J. Anderson.	161. W. Clark.
3365. W. Rowan.	185. W. E. Newton.
3376. H. Goodfellow.	243. W. E. Newton.
3384. W. E. Gedge.	

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

1452. P. and J. B. Spence.	1480. F. A. E. G. de Massas.
1526. J. Jobson.	1504. R. and L. R. Bodmer.
1477. W. Dawes.	1522. S. G. Hewitt.
1493. R. W. Thomson.	1517. E. M. Boxer.
1465. E. Pope.	

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

1455. I. Whitesmith & J. Steven. | 1466. M. & M. Myers & W. Hill.

Journal of the Society of Arts.

FRIDAY, JUNE 28, 1867.

Announcements by the Council.

Visit to the Paris Exhibition.

The Council have directed the Secretary to make arrangements for a visit of the members of the Society to the Paris Exhibition. The period for this visit is not yet fixed, but it will probably be towards the latter end of July.

Artizans' Visits to Paris.

The following is the list of subscriptions up to the present date :—

H.R.H. the Prince of Wales, President	£31	10	0
Society of Arts	105	0	0
Earl Granville, K.G.	5	0	0
Lord de L'Isle	10	0	0
Thomas Twining	2	2	0
Sir J. P. Boileau, Bart.	5	0	0
George Godwin, F.R.S.	1	1	0
Vice-Chancellor Sir W. Page Wood, F.R.S.	10	0	0
W. H. Bodkin (Assistant-Judge)	3	3	0
Sir Rowland Hill, K.C.B.	3	3	0
Benjamin Shaw	2	2	0
Alfred Davis	10	10	0
Eugène Rimmel	5	5	0
Frederick Mocatta	2	2	0
James Marshall	2	2	0
Robert Dawbarn	1	0	0
Henry Vaughan	10	10	0
Philip Sancton	5	0	0
Somerset A. Beaumont	5	0	0
G. Dixon, Mayor of Birmingham	5	5	0
Messrs. Smith and Wright, Birmingham	5	5	0
Messrs. Griffiths and Browett, Birmingham	5	5	0
Henry Weiss, Birmingham	2	2	0
W. H. M. Blews, Birmingham	2	2	0
W. Middlemore, J.P., Birmingham	5	5	0
Thomas Lloyd, Birmingham	2	2	0
Messrs. Elkington and Mason, Birmingham	5	5	0
Messrs. John Hardman and Co., Birmingham	2	2	0
Messrs. F. and C. Osler, Birmingham	5	5	0
The Proprietors of the *Birmingham Journal and Daily Post*	2	2	0
The Proprietors of the *Birmingham Gazette*	2	2	0
R. L. Chance, Birmingham	2	2	0
T. Avery, Birmingham	2	2	0
W. Tasks and Sons, Birmingham	2	2	0
W. Lucas Sargant, Birmingham	2	2	0
— Mountain (Messrs. Walter, May, and Co.), Birmingham	2	2	0
Decimus Burton, F.R.S.	1	0	0
W. Botly	1	1	0
Professor Robert Bentley	2	2	0
John Stuart Mill, M.P.	1	1	0
G. F. Wilson, F.R.S.	2	2	0
Henry Creed	1	1	0
The Marquis of Salisbury, K.G.	10	0	0
D. Roberton Blaine	2	2	0
William Hawes	2	2	0
Seymour Teulon	1	1	0
G. N. Hooper	2	2	0
Lord Taunton	5	0	0
Henry Cole, C.B.	1	0	0

Subscriptions.

The Midsummer subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Sixteenth Annual Conference.

The Sixteenth Annual Conference of the Representatives of the Institutions in Union and the Local Educational Boards with the Council of the Society, was held at the Society's House on Wednesday, the 19th inst. The Right Hon. Henry Austin Bruce, M.P., presided.

The Secretary having read the annual report to the Council of the Society, which appeared in last week's *Journal*,

The Chairman said, before entering upon the discussion of the subjects suggested for the consideration of the Conference, it would be convenient to know whether gentlemen had any observations to offer with respect to the time for the final examinations, or whether the time as usually fixed was generally found to be convenient.

No observations being offered,

The Chairman requested the Conference to proceed with the consideration of the first subject on the agenda, viz. :—

Whether the means at present available for the promotion of Primary Education are sufficient to qualify the Working Classes to take advantage of the Secondary Instruction offered by Institutes to Adults?

Mr. Harry Chester said, as he had put this subject on the list, he might be permitted to commence the discussion of it by moving a resolution replying to that question in the negative. Having taken great interest in these examinations from the commencement, and having, with one exception, attended every Conference, he was happy to say the report presented on the present occasion was, in his opinion, the best they had ever received. The increase of the number of candidates, both in the elementary and final examinations, and the improvement in the character of the work done, were causes for congratulation, and he thought they had great reason to be satisfied with the work which the Society of Arts and the Institutions in connection with it had now been engaged in carrying out for a period of eleven years. They must, however, all be struck with that which appeared in the reports of the visiting officers of the district Unions—that which had long been apparent to his mind, and, no doubt, to that of the right hon. chairman, who had such a perfect knowledge of the subject of national education—viz., the great difficulty which all the Institutions had to deal with in affording secondary instruction, in consequence of the lamentable deficiency of the means of primary education throughout the country. Doubtless there was in many places an admirable system of primary education at work (for he believed the system of schools under the Committee of Council on Education, as far as it went, was as good as it well could be), yet it had no effect over a large part of the country with respect to children over the age of ten years, and the consequence was, that that which they gained at school was very soon lost, and the great bulk of the adult labouring population were totally unable to read and write. There had been controversies of late in the public journals upon the question whether the statements which had been

made as to the lamentable deficiency of national education were exaggerated or not. He did not hesitate to say he believed it was almost impossible to exaggerate the lamentable deficiency which still exists, and he thought this meeting, though not called upon to enter into the discussion of the general question of education, ought not to separate without an expression of opinion that the means of primary education were insufficient for their particular purposes. The resolution he begged to submit was as follows :—

"That the means at present available for the primary education of the working classes are not sufficient to qualify them for the receipt of secondary instruction in any localities where there are not voluntary promoters of schools who possess the amount of zeal, liberality, and pecuniary ability which are required to secure grants from the Parliamentary fund; and that, to provide adequately for the education of the working classes in general throughout the kingdom, the attention of Parliament should now be directed to the best means of dealing with the whole subject of national education."

This resolution referred to one of the most difficult questions of the day, that of compulsory education, a question which was, in fact, two-fold, first, whether they should compel property in particular localities to provide the means of education, and secondly, whether they should also compel parents to send their children to profit by those means when so supplied. He did not propose to touch the latter part of the resolution, but he believed public opinion was ripe to the idea that wherever there was property and a population there the means of education ought to be provided. His proposition did not tend to disturb existing arrangements, but where these arrangements failed, he submitted that Parliament should provide some other means of dealing with the question.

Mr. F. WOOD (Walworth Literary and Scientific Institution) seconded the resolution, and expressed his concurrence with all that had been stated by Mr. Chester. He said in the Institution he represented, the attempt to establish classes for subjects not amusing or gratifying to the personal vanity of the members had been a failure. Class after class had been formed and had died away ; but of the large number of members of the Institution he believed there were not more than four working men properly so called, and no inducements that were held out had the effect of adding to the members from that class of society. Lectures of a scientific nature were very thinly attended, while on occasions of musical entertainments or lighter amusements the hall was crowded. He believed the feeling of the country to be in favour of providing a remedy for the wide-spread ignorance which prevailed among the labouring classes of the kingdom.

Dr. WATTS (Lancashire and Cheshire Union of Institutes) considered the resolution was drawn too mildly. It was certain nothing could be more true than the assertion that the means at present available for the primary education of the working classes were not sufficient to qualify them for the receipt of secondary instruction in any locality where there were not voluntary promoters of schools who possessed the amount of zeal and liberality required to secure grants from the public fund. Nobody could doubt that. He went further, and said they had not primary education enough, even in the localities where the parliamentary grants were given, to enable the youth of the country to get the secondary instruction which the Literary Institutions were intended to supply. He particularly called attention to the report of the visiting officer of the Lancashire and Cheshire Union, and to the fact stated in that report that of the Lower Grade candidates 489, out of a total of 602, had attended day school for an average of 5·5 years, and had left school for not more than an average of 2·8 years, all of whom failed to pass the Lower Grade examination, which only included the rudiments of arithmetic, British geography, and of English history.

Mr. H. H. SALES (West Riding Educational Board) said this examination corresponded with No. 4 of the Government grade, the other subjects being optional.

Dr. WATTS went on to remark if this were the case amongst pupils of the Lower Grade in those Unions of Institutions where they received more than five years' day-school instruction, he was not wrong in saying the provision for education where Parliamentary grants were given was not sufficient to qualify them for the secondary instruction they wished to give. The Educational Aid Society of Manchester had made searching examinations throughout Manchester and Salford, and the result had been to show that more than half the children of school age were neither at school, nor at work ; and further, that three-fifths of the absentees were unable to pay anything whatever for school fees. To enable them to judge of this by the standard which was set up, he might state that the society to which he referred assumed that wherever the income per head per week, exclusive of rent, was three shillings, these people could afford to pay for their instruction ; but in the case of more than half the absentee children, it was found that the weekly income was less than three shillings per head, exclusive of rent. Therefore, nothing less than free schools, with powers to compel attendance at school, would secure primary instruction for that class of the population. Even in the case of Manchester and Salford, which received a share of the parliamentary grant, there could be no hesitation in saying the provision for primary instruction was very insufficient, and he suggested that the resolution should be altered to this effect—"That the attention of Parliament should be directed to the best means of dealing with the whole subject," instead of "those localities where such zeal and liberality did not exist ;" and with that alteration he should support the resolution, because the time was come when it was found absolutely necessary we should look to a national system of education ; and he believed a national system of education was impossible unless it provided for free schools upon a right basis, with local management and government supervision. Adopting those principles, and passing some such bill as the right hon. chairman had now before the House, which was a permissive bill, and which, if passed, would be adopted by Manchester and Salford, so as to give some experience to the country generally,—if some such bill were passed, they might look forward to nine or ten years of progress, and by that time they would have, probably, an efficient national system of education. He should not oppose the resolution, even if the alteration he suggested were not adopted.

Mr. CHESTER expressed his willingness to adopt the alteration suggested by Dr. Watts, adding, that if he expressed all he thought and felt on this subject he should propose a much stronger resolution.

Lord LYTTELTON (South Staffordshire Association) would support the resolution. He thought the merits of the resolution were, in the first place, that it was mildly expressed, and in the next place it did not go into particular details. The present subject was one of a general character, and so was Mr. Chester's resolution, which made him the more able to support it, because he could not entirely agree with some of the strong statements that had been made in treating this question. Mr. Chester said he had not put the case half strongly enough. They might agree in the practical course to be adopted on this and other questions without agreeing to the facts and conclusions of those who brought them forward. He did not deny positively what had lately been stated—that there were in London 150,000 children uneducated. That might be so, but he submitted it was utterly unproved by the method of investigation which was pursued. He believed that method had been pursued not only on this subject but on others, and it involved such obvious fallacies that it was inconceivable how it obtained such general currency. He took it that this investigation was made on the same plan as a parish or police investigation was made with regard to the attendances at church. They went on a given day, and found a number of children who ought to be at school and were not, and they put them down as uneducated.

If they were not at school on Monday they might be on Tuesday. What ought to be done was an investigation by the clergy from house to house, not to ascertain a fact at a given moment, but to ask, "Does that child go to school, or has it ever been to any school?" At the same time this did not affect the practical question before them, for it could not be denied that the education received was insufficient. But when Mr. Chester said he had not spoken strongly enough, he (Lord Lyttelton) said that when they were told that below a certain station the whole population were unable to read and write, he believed such statements utterly fabulous. He did not doubt they were unable to read and write as well as they ought, and could do neither without painful exertion: and this ought to be remedied. He could not say it did much good to give such general statements as these. So also with regard to the inability to pay, adverted to by the preceding speaker. He (Lord Lyttelton) doubted whether that was the case except with more than a very few, and, literally speaking, it was impossible it could be true in the present state of the law. The Act known as Denison's Act existed, and it was in the power of the boards of guardians to ascertain which of every one of the population had not their children at school, and which were literally unable to pay.

The CHAIRMAN—They must be receiving out-door parish relief.

Dr. WATTS said there was this difficulty; when the parents ceased to receive out-door relief, unless the children were sent to school the Guardians were liable to surcharge; and because of that surcharge they took no interest in the Act.

Lord LYTTELTON—That was quite true; but see on what a narrow edge they balanced the question. There were vast numbers of people just able to pay their way, except twopence per week, and we must always consider education one of the necessaries of life; and if the means of the parents were so extremely narrow the question was whether the allowance should not be increased, to the extent of enabling them to pay the small school fees. It seemed to him, while they agreed in the general conclusions stated in the resolution, the practical remedy consisted in some form of compulsory education. There were many ways of applying compulsory education; and rate-paying was one. Some years ago, in a pamphlet which he wrote, he asserted the principle of compulsory education, and it had given him satisfaction to see of late years public opinion was coming round to that view. When he gave evidence before the Duke of Newcastle's Commission, after he printed that pamphlet, he saw that public opinion was going in an opposite direction, and that the feeling in favour of compulsory education was dying out; but it had revived within the last few years; and he hoped they would keep the principle in view, that it was a part of the duties of citizenship that the education of the people should be in some manner secured and provided; and this, he apprehended was the principle advocated by the author of the resolution, and as such he should support it.

Mr. JAMES HOLE (Yorkshire Union of Institutes) had frequently heard doubts as to the extent of ignorance expressed by those who were not familiar with the habits of the poor in large towns. He had heard the strong facts stated with regard to the town of Leeds disputed, when he recommended that the simple test should be applied of taking a cab and canvassing for themselves whether what was stated was not true. If the noble Lord who had just spoken would honour Manchester or Leeds with a visit he could soon be convinced of the accuracy of the facts stated by Dr. Watts. As hon. secretary of the Yorkshire Union he could state, with reference to elementary education in Mechanics' Institutes, that in his Union, which comprised 24,000 members of Institutions, of that number one-third attended evening classes, and the large majority of them were doing the work which ought to have been done in the primary schools. There were but few of the Mechanics' Institutions engaged in secondary instruction, and the young men were struggling with difficulties in the Mechanics' Institutions which ought to have been surmounted years before. With reference to the powers of Boards of Guardians, he spoke to the clerk of a Board in Leeds and asked him why those powers were not enforced. The reply was that it was the cause of a great deal of ill-feeling, and practically the powers were not enforced. It was true by law the guardians could compel the children of a parent receiving relief to be sent to school, but it was practically inconvenient to take this course, and the law was a dead letter. He fully endorsed the facts stated by Dr. Watts, and was well acquainted with the districts examined by the Educational Aid Society in Manchester.

The CHAIRMAN begged to inquire whether the examination into the state of education among the lower classes in London was made in the manner described by Lord Lyttelton, or whether the clergy made a return of the number of children on their books?

Rev. JOHN OAKLEY (Metropolitan Association) said with reference to the type and standard of primary education, the startling facts of the fewness of the number of children that would pass even the sixth standard of the Government examinations had been twice brought under the notice of the House of Commons; and when that standard was deliberately drawn at a point to represent the minimum of education, it might be taken for proved that the deficiency of primary education was so great that the work of the Institutions was in a large degree directed to elementary instead of secondary instruction. His own experience as a member of the Council of the Metropolitan Association quite confirmed that statement. He found children who had been five years at school making the most flagrant errors in spelling. With regard to the method of investigation, which gave the result of 150,000 totally uneducated children in London, to which the noble lord took exception, he (Mr. Oakley) would state that the clergy were furnished with a series of questions, the replies to which no doubt, in many cases, were in a great measure guessed at; others, he knew, made the most careful investigations, such as Lord Lyttelton had described, from house to house, and their inquiries embraced other than Church of England schools. In many cases the returns were most full, while others, no doubt, were the result of haphazard estimate; and looking at the deficiency of primary education he did not think it was too much to infer that those children who were absent from the schools were practically wholly uneducated. He firmly believed that London's contribution to that class would exceed 150,000.

Mr. H. H. SALES said no remark from him was needed to strengthen the statements already made, that the means available for primary instruction were not sufficient to enable them to conduct the Institutions properly. As the representative of the West Riding Educational Board, he would say that, in his opinion, nothing did so much injury to education as conclusions drawn from statistics respecting the state of education in the country. It did not matter whether there were 100,000 or 200,000 uneducated persons in their midst, for seeing the state of education with their own eyes, they could not but arrive at the conviction, without statistical tables and reports, but by merely going amongst the working classes, that in the matter of the primary education of the people they were doing very little at the present time. Seeing how much the work of the Institutions was thwarted and hindered by the low state of education of those who attended the Institution classes, they wanted no statistics to assure them that the state of primary education with regard to the labouring population was lamentably deficient, and the work would not progress till the nation took up the question of primary education with greater earnestness than it had ever yet done. He cast no reflections upon the Committee of Council. To them they were indebted for the excellent

scheme of education now in force. But they wanted more than that. It did not touch the lower population to the extent that was required. They could not succeed until the primary schools were in a far more efficient state and better attended than they were at present. This led him to the remark of Lord Lyttelton, questioning the statement of Dr. Watts with regard to the inability of people to pay for education. It was not so much a question of inability to pay as of disinclination to pay. There were many people earning large wages who did not see any advantage arising from educating their children. Therefore, they must not go upon the question of inability to pay, but rather upon that of indisposition to do so. Those who brought children into the world should not be permitted to allow them to grow up as pests of society. They must set about remedying the evil, until people no longer came to the Institutions saying, "Teach us, for we have yet had no education in primary schools."

The CHAIRMAN said in reference to the question of educational statistics, when they found there were 150,000 children in London, and 55,000 in Manchester, not at school, it settled very little; because, as they took the age of nine years, it was possible that some of them might have been at school for some portion of that period. But there was a better test than that, viz., how many they found at a given time on the books of the schools? They were told, in populations in which the working class bore the ordinary proportion, if they found less than one in six upon the school books, then there was a deficiency of education. Tested by that gauge, Manchester had one in eleven; it was clear, therefore, that that city had half as many children at school as it ought, and that was the result of a very minute investigation made there. Some time ago an investigation was made in the town of Merthyr Tydvil, with a view to supply school accommodation for 1,000 children. One district of the town was better provided in respect of schools than the other. It was found that in the Dowlais portion there were 16,000 children, and that school accommodation existed for 2,600, with as good average attendance as possible. He had himself charge of a school in a locality where the population was 7,000. He was quite dissatisfied with the attendance there. He knew there was a vast number of children between nine and ten who were not at school, the parents being tempted by high wages to send them to work; yet there were 1,024 children at the school, or 1 in 7. He was dissatisfied with that, and hoped to improve it. Taking another part of Merthyr Tydvil, exclusive of Dowlais, there was a population of 41,000; he found there only 3,200 children were upon the school books, whereas it ought to have been 7,000, or 1 in 6 instead of 1 in 13. As to the question of ability to pay, he thought Lord Lyttelton had omitted to observe that between ability to pay and absolute pauperism there was a large margin; and it was not a question of mere ability to pay, but of ability to do without the wages which the children would earn, for these were the great temptation to send children to work. He was not one of those who thought compulsory education could be immediately applied. They were about to extend the provisions of the Factory Act to many other employments, which would have the effect of bringing a large additional number of children into the schools, but the work must be progressive. He thought they were travelling as fast as they could fairly do, but he was of opinion that the system of the Privy Council, which, however, was not the system of the Privy Council itself, but the system which they were empowered by Parliament to carry out, that system was at this moment not only inadequate, but nothing could make it an efficient system of education for this country. Another experiment had been proposed, and would probably be tried, for he believed it was impossible for Parliament to reject the propositions now before them without offering at the same time some alternative. He hoped this resolution would be carried by the meeting. He did not believe there was any exaggeration in the language used by Mr. Chester. It would be remembered that the report of the Committee on Education stated that only 1 in 4 of those educated in the best primary schools could read and write satisfactorily; and it might fairly be assumed that more than half the population were unable to read and write to any useful degree. They had an immense task before them. At present they had not the machinery, but it would have to be provided, and provided by the State.

Mr. CHESTER said he need not offer any observations in reply, as they had a general concurrence of opinion in favour of the resolution. He had not pretended to say what Parliament should do, but he was not satisfied with what Parliament had done. They must do more to provide for the education of the people of this country.

Mr. F. REYNOLDS (City of London College) wished to support all Mr. Chester had said. For many years he had been connected with educational work, and had acted as examiner for three Local Boards, and his experience of primary education was that it was most unsatisfactory.

Rev. J. S. BARROW (Ryde Philosophical and Scientific Society) would say one word in defence of the schools aided by government. He thought they had been unfairly spoken of. As the result of his own experience of twenty years in elementary schools, he would say any child who attended those schools regularly from six to ten years of age would not only be able to read and write fairly and well, but would also have acquired a sound substratum of knowledge. He was not prepared to say one word with regard to the mass of the people being without education, but he would say that did not affect the character of the education already provided, inasmuch as he believed it to be, as far as it went, excellent. Mention had been made of the deficiency of primary education in those who presented themselves for the Elementary Examinations of the Society. That was probably true, as they left school at 11 years of age, and there was a blank between that and 15 which they could not fill up.

Mr. THOMAS LAWTON (Lancashire and Cheshire Union of Institutes) said in his Union there were large numbers of children out of the schools in a state of educational destitution; but there was also another point:—They had a large number of children at school with whom the masters found difficulty, because there was no provision made, except in the colliery districts, to check the admission of children on the "half-time" system. Schoo'masters had told him if there was some regulation of this kind,—that no child should be allowed to go on the half-time system without first obtaining a certificate of the second or third standard, they would get on better. He believed the extended operation of the Factory Act was doing a great work in this direction; and he anticipated great advantages from the half-time system, the scholars being first certified up to a certain point.

The CHAIRMAN observed that Parliament had never gone so far as to say that no child should be allowed to work who could not read and write; but with reference to the colliery population, children between ten and twelve years of age were not allowed to work if they could not produce a certificate that they could read and write, or that they had attended school a certain number of hours per day.

Mr. LAWTON believed the colliery masters were instructed not to accept any children without such certificate.

Rev. JOHN OAKLEY subscribed to a large extent to the remarks which had been made in disparagement of statistics, but he did not think, while other statistics were held to be fallacious, those of the Royal Commissioners should be taken as infallible. He thought they were equally open to criticism.

The CHAIRMAN remarked that the National Society, in

their annual report, adopted the figures of the report of the Royal Commission presided over by the Duke of Newcastle. He considered that report was one of the most valuable documents ever issued on the subject of education; but its weak point was always known to be its statistics, and he was afraid the National Society in their report relied to a great extent upon the same calculations as had been supplied to the Royal Commissioners. The statement of the Royal Commissioners was that there were some 120,000 children who might be regarded as never having entered a school, and they said of those who had been to school for any time there was 1 in $7\frac{3}{4}$ of the population. That settled nothing, because the question was, how much time had been passed at school? If 1 in $7\frac{3}{4}$ had been at school only for a few months, practically they might as well not have been at school at all. After a great deal of examination he felt that the statistical tables of the Royal Commissioners were the only part of their report not worthy of confidence.

Mr. Larkins (Metropolitan Association), with regard to the statistics, desired to confirm what had fallen from Mr. Oakley. With regard to the inability to pay for education, he believed that was the grand reason why the state of education was so low. It was found amongst 100 members of a Working Men's Club at Westminster that 50 could neither read nor write. They were so poor that they could not afford a halfpenny per week for their own education. What, then, must be the state of the case with regard to the children of those people? The lectures given to working-men in Lambeth last year, through the instrumentality of Mr. Twining, brought together on some occasions as many as 1,500 people; and he found that fully two-thirds of the men attending these lectures were utterly unable to read or write. He thought the remedy which was proposed, in the shape of evening classes, might possibly be, to a certain extent, the cause of the disease in some cases, because it was said by the people they could send their children to work in the day, and at the age of twelve they would attend the evening schools, and thus up to that age all primary instruction of the children was neglected.

Mr. Alexander Craig (Glasgow Institution), on behalf of the large and important centre which he represented, expressed a hope that full force would be given by the Conference to Mr. Chester's resolution.

Mr. Marcus (Worcestershire Union) suggested an alteration in the wording of the resolution. It did not, he said, imply what they were aiming at. It implied that the education now given in the National Schools was not sufficient for the purposes of the Institutions.

The Chairman remarked it rather implied that the application of the means was insufficient. It was not said that the schools already provided were not sufficient.

Mr. Marcus apprehended it was not that the schools were not sufficient, but they wanted to bring a larger number to avail themselves of them.

The Chairman then put the resolution, which was carried unanimously.

Whether Provisions should be inserted in the Manchester Education Bill, now before Parliament, which would authorise Grants to be made to Evening Schools and Classes?

Mr. Chester said he felt some diffidence, in the presence of the right hon. chairman, who had introduced this Bill into Parliament, in describing its provisions; but reading the Bill, it struck him that it excluded everything in the nature of evening schools from participation in the rates, to raise which powers were given. If he was wrong in this idea he would withdraw the subject; but he understood the Bill to provide that no grant was to be given in respect of the attendance of persons at schools after five o'clock in the afternoon; and if that were so, it excluded all evening schools and classes. He hoped the time was come when it was admitted that evening instruction, by means of classes, was not a mere ornamental and accidental addition, but an essential part of education. He had expressed his views on the subject in the following resolution, which he would simply commend to the favourable notice of the Conference:—

"That, as the demands of labour make it impossible that the children of the working classes shall be retained at day schools until their education is complete, and as their attendance at evening classes is essential to the completion of their education, this meeting is of opinion that, in any measure which Parliament may pass for authorising the support of schools by local rates, provision should be made to include in such support the classes for systematic instruction in evening schools and Institutes."

The Chairman, having read the resolution, said he would ask Mr. Chester whether he limited the application of the rates to payment for children in the night schools?

Mr. Chester replied he did not limit it to children. He thought wherever there was provision for education, those means ought to be applied to adults as well as children. He would mention the City of London College and the London Mechanics' Institution, than which, he would venture to say, there were no schools in the country which were doing a more important work in education.

Mr. Sales having seconded the resolution, and expressed his concurrence with what had been said by Mr. Chester,

Dr. Watts said, admitting the principle laid down by Mr. Chester, the question in his mind was whether the introduction of a clause into the Bill, extending the grants to evening schools and classes, would not endanger the Bill itself. If it was the opinion of the chairman that it would do so, he would ask Mr. Chester to withdraw the resolution. This was a question in which he thought they should be guided by the judgment of the chairman. For his own part, he thought that when youths reached the age of (say) 14 they ought to be at work, and for those who were at work it seemed preposterous to levy a rate to pay for their education.

Mr. Chester remarked he had never proposed that the education of adults should be given to them altogether gratuitously, but only that they should not be absolutely excluded from assistance from the rates.

Dr. Watts objected to that on the same principle, because he thought when people were at work they could and ought to pay entirely for their education, and if they once introduced the principle of paying for those who were earning wages he did not know where they would stop.

Mr. Chester said they assisted the education of the higher classes in the Universities; why should they not assist these poor people? Under some circumstances even at present Government gave aid to night schools.

Dr. Watts was aware there were exceptional instances made by the Privy Council in which aid was given to evening schools, but he believed the Privy Council had since done all they could to lessen that aid. If Parliament deliberately adopted this principle he had nothing more to say, but he repeated his opinion that where people were earning wages they should pay for their instruction, and they ought to be earning wages at the age of 14 if they belonged to the working class. If the chairman thought, with such limits, the introduction of a clause of this nature would not endanger the Bill, he (Dr. Watts) would be in favour of it.

The Chairman admitted that the Privy Council had been somewhat illogical in the principle adopted in aiding night schools, inasmuch as it excluded the aid to a number of persons who were of an age to pay for their own education. In the opinion, he thought, of the majority of the public, the Committee had been wisely illogical in the course they had pursued. His own impression was, if the conditions with regard to the night schools were guarded in the same way as they had been by the Minutes of Council, the introduction of a clause like that proposed would not endanger the Bill. Many persons, both in and out of Parliament,

believed that the merits of night schools were exaggerated. Many others considered night schools good elementary schools, in which those might be taught who could not attend day schools. He thought that was a delusion, but he agreed that night schools were valuable as enabling children to continue their education after they had commenced working. So far from the Committee of Council having restricted its assistance, he was bound to say one of his own acts was to introduce a Minute which was adopted by Parliament, and which facilitated the examination of night schools at the time when they were most fully attended. The result of that had been to increase the payments to night schools, and also to increase the attendance at them. The question was whether the money of the State was well applied in this direction; if it was so, it was a departure from the strict principle which might be justified.

Mr. CHESTER did not wish to endanger the Bill by the introduction of this clause, but his own conviction was it would add to the popularity of the measure. He had always found, in all the Institutions he had visited, the mention of evening classes was most popular. He did not say they should entirely provide for the education of adults, but he wished Parliament to empower the local managers of the locally-raised rates to grant such aid as they might think fit to the evening schools and classes of the locality. There were many forms of encouragement, such as examinations with consequent certificates and prizes, which might well be provided from such sources without having any tendency to pauperise the education of adults.

Mr. J. HOLE (Yorkshire Union) remarked that no sum which they could obtain from the working classes themselves would be sufficient to pay for their education. At Huddersfield, where the most successful Institution existed, the highest sum paid by working men was 3½d. per week, and a larger sum was realised by means of the weekly payments than if they were spread over a longer period. What was the result? It was necessary to raise by subscription £300 per annum, the larger portion being contributed by the manufacturers, to pay the expenses connected with the education imparted in the Institution. Notwithstanding the subscription by the town to the amount he had stated, and the 3½d. per week paid by the members, the services of half the teachers were unpaid. Going from a great Institution like that of Huddersfield to the average of night-schools, what could be expected from the working youth? In many places the standard of payment was as low as three half-pence or two-pence per week, and he put it to those present whether they could expect to give efficient evening instruction for that amount? He said it was impossible. Agreeing with the principle that the scholars should pay as much as they were able to do, there was still wanted liberal support from the State to make the evening classes efficient. He thought the great defect of the Minute of Council was that it only gave aid to evening schools held in those buildings which were under inspection. That generally closed the matter at once, and to that limitation he attributed the small extent to which evening class instruction was pursued. Until education was more valued than it was at present, they must expect the youth of the working population to be taken away from school at 12 or 13 years of age, and they wanted an attractive system to induce them to continue the scanty education they had received in the day schools. In his opinion one of the most valuable principles of the Bill before Parliament would be to give aid to properly conducted evening classes.

Mr. HOLBREY (Dudley) was able to speak to the success of these schools in Dudley as far as they went, but they were in great want of pecuniary support. There were boys taught in the night schools who ought not to be there, as they attended the day schools. In the evening schools boys were not admitted under the age of 12, and they paid 2d. per week up to the age of 14. Those payments were obliged to be supplemented by subscriptions raised in the town. He should be glad to see grants made towards the support of the schools in connection with the Institutions.

Mr. LAWTON said the Department of the Committee of Council on Education already granted aid to a considerable extent. There were 41 Institutions in the Lancashire and Cheshire Union where the teachers received payment from the Department. He was in favour of Government aid being extended to evening schools not in connection with day schools under inspection.

The CHAIRMAN remarked it was a different thing receiving aid from a central fund and receiving it from a local source. It was impossible that a Government administering a public fund could do so except upon certain conditions which would secure the efficiency of the teaching. But if the educational funds were administered under local supervision, grants might be made which the state could not be said to make. That was one of the advantages, he thought, of the Bill now before Parliament. He then put the resolution, which was unanimously agreed to.

"WHETHER, CONSIDERING THE VALUABLE RESULTS OF THE CO-OPERATION WHICH THE ROYAL HORTICULTURAL AND GEOGRAPHICAL SOCIETIES, AND CERTAIN PUBLIC COMPANIES, HAVE AFFORDED TO THE SOCIETY OF ARTS IN EXTENDING THE SPHERE OF ITS EXAMINATIONS, THE LIKE CO-OPERATION CANNOT BE OBTAINED FROM OTHER SOCIETIES AND COMPANIES, ESPECIALLY FROM THE ROYAL AGRICULTURAL AND BOTANICAL SOCIETIES?

Dr. WATTS said, as Chairman of the Manchester Horticultural Society, he believed he could promise such co-operation as they could afford, if they could see any benefit likely to result from it.

Mr. JOHN GIBBS (Chelmsford Literary and Mechanics' Institute), as one who had taken some trouble in attempting to promote the study of botany among the working classes, said that though they heard of the valuable results of the co-operation of the Royal Horticultural Society and other societies, he must say they could not congratulate themselves very much on the increased number of candidates which it had produced in the Society's examinations on the subject of botany in particular. In 1860, before that co-operation was afforded, there were six candidates who passed the examination in botany, two of whom obtained first-class certificates. It seemed difficult to interest the working classes at all in this study; but that the Royal Horticultural and Botanical Societies might do something to promote it he was inclined to believe. From his own experience as a teacher of botany, the class most likely to pay regard to it were those who by their social position were disqualified from receiving the prizes offered by the Society. The special prizes to be competed for by gardeners and others were no doubt valuable.

Mr. SALES suggested that this was a subject rather for the consideration of the Council of the Society than the Conference.

Mr. WHITE (Woolwich) recommended the encouragement of cultivation on the allotment system, more especially as the gardens which formerly existed to so large an extent in the suburbs of London were now occupied by buildings.

Mr. H. W. FREELAND had no doubt any definite proposition on the subject made to the Royal Agricultural Society would have the attention of that body.

Mr. CHESTER said he had put this subject on the list with the view that the examinations should be placed on as wide a basis as possible. A year or two ago they obtained the co-operation of the Royal Horticultural Society, which had been advantageous in spreading a knowledge of their system of examinations amongst the gardening class; and last year, through Sir Roderick Murchison, they had the co-operation of the Royal

Geographical Society in the subject of geography. It occurred to him, if they could obtain the co-operation of other societies in like manner, the prestige of the examinations would be extended. He was particularly anxious to interest the Royal Agricultural Society in this matter, because they knew that the education of the agricultural population was lamentably neglected. A deputation from this Society was courteously received by the Council of the Royal Agricultural Society, who were good enough to express an interest in this object, but nothing further came of it.

Mr. Marcus thought the prizes offered in botany especially were not sufficient to induce the study of that science; there did not appear to be any increase in the number of candidates in that subject.

The Conference then proceeded to consider the next subject on the list, viz.:—

Whether any additional means can be devised to induce the Institutions to form District Unions, with paid Visiting Officers, in connexion with the Society of Arts.

Dr. Watts suggested that the object implied in this subject would be promoted by holding meetings in different parts of the country, where District Unions of Institutions did not exist, at which reports should be presented of the operations of the Unions already established, and a representative of the Society of Arts should attend; this would be the means of forming new Unions, and of bringing more Institutions into connexion with the Society of Arts.

The Chairman remarked that he had seen the advantages of the Union established in East Lancashire, where a number of Institutions were previously useless for the purposes of education, and existed only for objectless amusement. Since the formation of the Union they had been converted into admirable means of education.

Mr. Chester was convinced it only required the advantages of these unions to be known to increase the number of them.

Dr. Watts proposed the following resolution:—

"That the Council be requested to consider the propriety of sending a delegate to various parts of the country to promote the formation of district unions of Institutes."

The resolution having been seconded and supported by Mr. R. H. Brookes (Banbury Mechanics' Institute), was unanimously passed.

Whether additional interest in the Final Examinations might not be excited by the establishment of Special Prize Funds in the District Unions, to which Supplementary District Prizes might be added by the Society of Arts?

Mr. Sales, in introducing the above subject, remarked that a great deal of encouragement in the examinations of the Society rested upon the amount of prizes given in the various localities in which the examinations were carried on, and it was not sufficient that a general prize fund should be instituted for the whole of the country. The various districts were so different one from the other that it was impossible the general prizes given by the Society could influence the whole of the country. It had been found that by giving local prizes a special stimulus was given to the work. In putting this subject upon the paper, he proposed to suggest that they should agree to the establishment in the various district unions of special prize funds for the encouragement of the examinations of the Society of Arts. These prize funds would vary in different districts according to the circumstances of the case. Speaking as Honorary Secretary of the West Riding Board, he might state they were prepared to raise a prize fund for the whole of Yorkshire, because they believed these special prize funds to be of incalculable value; and, having done this, they thought they would be in a position to ask some aid from the Council of the Society—that some special amount might be given to such districts as raised these special funds. A special examination on religious subjects, on the plan adopted by the Metropolitan Association, had been instituted for the whole of Yorkshire, under the supervision of the Archbishop of York and the Bishop of Ripon, and a special prize fund was raised for the purpose, to which the National Society had contributed £10. They would not ask for a large sum from the Society of Arts for the proposed Yorkshire General Prize Fund, because it was not the amount but the encouragement which they sought for. It might be said the funds at the command of the Council were limited; it therefore was incumbent upon him to show how, without encroaching upon the present expenditure for this purpose, his proposition might be carried out. Looking to the programme of examinations, he was prepared to say there were some subjects which entailed considerable expense on the Society, without making an adequate return. Looking to Navigation, he found in successive years the number of candidates in that subject was reduced from five to one, and the cost for that one candidate was not less than £7 or £8. In Mining and Metallurgy, again, the candidates for examination were very few, and the same might be said for Italian. He was prepared to advance the statement that there were a number of these subjects which it was an injury to them to have upon the list, because it was said in some quarters that they were over-educating the working classes. That cry was always being raised, and it was well, without pandering to popular taste, to avoid everything which gave a colour to that statement. He thought Italian and Spanish might be very well expunged from a system of examinations instituted for the benefit of the labour population. That money might be saved to the Council, and appropriated to special district prize funds such as he had described. He begged to submit the following resolution on this subject:—

"That the establishment of district prize funds increases the interest in the examinations, and the Conference recommends the Council to take the same into consideration, with the view of rendering such assistance as they may deem expedient."

Mr. Larkins doubted whether these special prizes might not be detrimental to the various other unions. For his own part he did not think money should be voted by the Society otherwise than for the benefit of the candidates in general.

Mr. Heller (Lambeth Local Board) seconded the resolution, though, he said, he did not approve of the suggestion of the mover of it to aid the special prize fund by eliminating the subjects mentioned from the examinations. This went upon the assumption that the manual labour classes only were to be benefited, whereas he understood the certificates were open to everybody who chose to come up for examination. He thought it wrong to augment the prize scheme at the expense of subjects which the Council had decided to put upon the list. At the same time he hoped the Society might be able to assist district prize funds.

Mr. Chester would be glad if something of the kind suggested could be done; but, as a member of the Council of the Society, he could give no pledge that they would be prepared to make grants of money for this purpose. He did not see any essential objection to the proposal provided the funds of the Society were not too severely trenched upon. They knew that grants in aid often had the effect of calling forth large contributions to meet those grants. If the Society did this for one union, however, they must do it for all, and the expense might thus be a serious matter. He should, however, have preferred that Mr. Sales had confined himself to pointing out what should be done instead of speaking of what should not be done. It was to be recollected that the scope of the Society embraced arts, manufactures, and commerce, and though it had given aid to the Institutions in the matter of education, yet there were demands upon it in the interests of art and commerce. The Italian and Spanish languages were necessary to a large number of persons engaged in commercial houses, having trade relations

with Italy and Spain; therefore, though there might be comparatively few candidates, it was of great importance to encourage the study of those modern languages, and he did not desire to see them eliminated from the list; nor did it seem necessary to add that the encouragement of the studies of mining and navigation was of immense importance in such a country as ours.

Dr. WATTS remarked that the importance of district prizes could not be over-rated. In the Union with which he was connected they offered special prizes for essays on various subjects, for drawing, and for examinations in political economy, and the results had been most satisfactory. As to the other point touched upon by Mr. Sales, our trade with South America was rapidly increasing, and the languages of commerce there were Spanish and Portuguese; he considered, therefore, that it would be a great mistake to expunge the former from the examination programme.

Mr. REYNOLDS did not see why the Italian and Spanish languages should be regarded as greater luxuries than French and German. He considered they should be equally within the reach of the persons whom the examinations were intended to benefit.

Mr. LARKINS saw no objection to the principle of the resolution, provided it was extended to all district Unions alike.

Mr. LAWTON supported the resolution. Special prizes in the Lancashire and Cheshire Union had been most beneficial.

Mr. MARCUS observed that he found it difficult to obtain candidates for examination on subjects for which there were general prizes of £5 and £3, extended over the whole of England, Scotland, and Ireland, and on that account he was strongly in favour of extending the system of local prizes.

Mr. SALES concurred with the last speaker that the feeling of candidates in the provinces was that the larger prizes were almost certain to be carried off by those who were within reach of the superior advantages of the London Institutions; but local prizes would afford a greater incitement to exertion. There might not be much difference between Huddersfield and Halifax, but there was a great difference between the Institutions in the north and those in the south of England. The members were of a different class. In the south a large number followed the occupation of clerks, whereas in the north the bulk of the members was composed of the manual labour and really hard-working class, whom it was their desire to encourage, but who were not in a position successfully to compete with the class of people in the south.

The CHAIRMAN thought there could be no objection to such a resolution as this being submitted to the Council, and it would be for them to determine whether they could appropriate any fund to the purpose stated.

The resolution was then adopted.

WHAT MEANS CAN BE ADOPTED BY THE LOCAL BOARDS TO SECURE A LARGER NUMBER (*a*) OF CANDIDATES FROM THE ARTIZAN CLASS AT THE FINAL EXAMINATIONS, AND (*b*) OF FEMALE CANDIDATES AT THE ELEMENTARY AND FINAL EXAMINATIONS?

Mr. LAWTON said that, with the view of offering every encouragement to candidates, in addition to the special prize fund for the whole district Union, it had been found beneficial to have special prize funds for some of the Local Boards, and one Board had offered prizes to those candidates who obtained the highest number of marks, and also to the female who stood highest in domestic economy. In the latter case these prizes led to the formation of a class for special preparation in that subject, and had been attended with the best results, in the increased number of candidates, as well as in the proficiency displayed. Last year no certificates were awarded in that subject; this year 13 certificates were awarded to females. In the Manchester Institution a gentleman offered a prize of £5 for book-keeping, in connection with that district, which produced a good competition. These special local prizes, he believed, acted most beneficially in stimulating candidates to come forward. In reference to female candidates, for two consecutive years there was a small number only in the needlework class, but the offer of a prize of £5 for shirtmaking produced an excellent competition. They did not, however, allow candidates to go in for these special prizes until they had passed the Elementary Examinations. Unless that were so, it might happen that a young woman would be able to cut-out and make a shirt, but unable to read or write. In this way the number of candidates in the Elementary Examinations was augmented. By bringing the prizes into the district, and offering them through the Local Boards, he felt persuaded they would have a large increase of candidates for the more important prizes of the Society of Arts. He, therefore, said it was desirable that Local Boards should establish as far as possible a system of special local prizes.

Mr. G. C. SHERRARD (Birkbeck Literary and Scientific Institution, London) said in his Institution prizes were offered for certain subjects from a fund, subscribed by the members, to the amount of £20 or £25, which acted as a stimulus to candidates to go up on those subjects, and it was found, after they had studied for the local examinations, they were in a better state to go up to the examinations of the Metropolitan Association and the Society of Arts. In the present year's examinations between 50 and 60 certificates of the Society had been gained by candidates from the Institution he represented.

No resolution being proposed, the meeting passed to the consideration of the next subject, viz.,—

WHETHER IT WOULD BE EXPEDIENT TO ADOPT, AS FAR AS POSSIBLE, ONE SPECIFIED TEXT-BOOK FOR EACH OF THE SUBJECTS IN THE FINAL EXAMINATIONS?

A brief conversation took place on this subject, an opinion being expressed by many who took part in it that any restriction with regard to text-books was undesirable, and that the means by which the required knowledge was obtained should be left, as much as possible, to the choice of the candidates. The high price of some of the text-books in the examination programme was alluded to, but it was pointed out that there really were, at present, no good and cheap text-books published for some of the subjects.

WHETHER IT WOULD BE EXPEDIENT THAT THE SOCIETY OF ARTS SHOULD DECLINE TO RECOGNISE AN ELEMENTARY CERTIFICATE OF ANY GIVEN YEAR AS A PASS TO THE FINAL EXAMINATIONS OF THE SAME YEAR.

In conjunction with this subject, No. 10 was considered, viz.:—

WHETHER, IN ORDER TO SECURE UNIFORMITY IN THE PREVIOUS EXAMINATIONS, THE SOCIETY OF ARTS SHOULD FURNISH AN ELEMENTARY PAPER (DISTINCT FROM THE ORDINARY ELEMENTARY EXAMINATIONS) TO MEET THE CASE OF THOSE CANDIDATES WHO MAY NOT, IN ANY PREVIOUS YEAR, HAVE OBTAINED ELEMENTARY CERTIFICATES?

Mr. LAWTON remarked that it was found that the holding of Elementary Examinations some five or six weeks before the Final Examinations caused confusion, from the two examinations coming so close together. In his Union, however, they did not publish the results till the Final Examinations were over, and they took the elementary certificate for 1866 as the pass for 1867, while that for the present year would be the pass for 1868. He thought it would be very desirable to hold the Elementary Examinations at a later period of the year. If they were held at the end of March there would be more time to rally their forces, and the result would be a larger number of candidates. He would suggest that the Society should arrange for the Elementary Examinations in future being held towards the end of March.

Mr. Heller (Lambeth Institution) thought nothing would be gained by the proposed change. The local authorities held the Elementary Examinations, and the Society allowed holders of elementary certificates to pass to the Final Examinations. Now, why should they be asked not to recognize the certificates of the same year? He saw no advantage to be derived from Mr. Lawton's proposition.

Mr. Lawton said the Elementary Examinations were becoming a very onerous matter. In his own Union they had as many as 1,200 candidates for Elementary Examination, and he thought that justified them in treating those examinations as a distinct affair. Probably in another year they might have 2,000 offering themselves for these examinations. He wished to see the Elementary Examinations kept distinct from the Society's examinations, and if they could be held at the end of March that could be accomplished.

Mr. Marcus considered that inconvenience would arise from the Elementary and Final Examinations following so closely upon each other. He was in favour of the existing arrangements remaining undisturbed.

The Chairman said Mr. Lawton would probably be satisfied with the discussion which had taken place on these subjects. The Secretary would report it to the Council, who would no doubt consider the expediency of making any change.

Whether it is Desirable, in the Elementary Examinations, to have one set of Papers instead of two, as at present, but with two Grades of Certificates, according to the merit of the Candidates?

Lord Lyttelton said this subject had been placed on the list by the Committee of the South Staffordshire Union, and he had been requested by Mr. Talbot, the secretary of the Union, to introduce it. The point was this—That in the Elementary Examinations there were two divisions for candidates, viz., the higher and lower grade, and for these two distinct sets of papers were provided. Mr. Talbot had given him a list of the results of the Examinations in the South Staffordshire Union in the present year, and it was curious to observe that the last twenty of the successful candidates in the higher grade and the first twenty of the lower grade might almost change places. The average age of the lower grade candidates was somewhat greater than the age of those in the higher grade, and the number of marks they obtained was higher in the lower grade than in the higher, and he was sure the two sets of candidates might have changed places. Quoting from a communication he had received from Mr. Talbot, that gentleman said:—"Another point worthy of notice is that now teachers have to instruct the scholars of the same class in two sections for the two different sets of papers. This is not so much felt where the schools are small, or where there is an ample staff of teachers, but it is felt where the staff is weak, or the school large; and where teachers grow anxious to place their scholars well in the examinations, this extra strain ought to be avoided. Then, practically, there is no real need for two sets of questions. A reference to our own list will show stronger special points in many of the lower grade candidates than in many of those of the higher grade. Considering that the scheme is fairly comprehensive, taking in Holy Scripture, English history, geography, grammar, and arithmetic, and, that all candidates may take all these subjects, there is ample scope for an examiner to classify the candidates according to merit, and to give them certificates accordingly. The only difficulty that will occur will be one for ourselves to meet; it relates to the prizes. We must make some other arrangement about them. But with that difficulty the Society of Arts will have nothing to do. I think the above are good grounds for asking the Society of Arts to do away with two sets of questions, and to let us have one set instead, but to let us have that one set so framed as to comprehend a larger proportion of scholars than is comprehended in either of the present sets. I mean that there must be a greater variety in the proposed one set of questions than in either of the two now used." He (Lord Lyttelton) suggested that there should be only one set of papers instead of two. He had so much confidence in the judgment of Mr. Talbot on this matter that he had no hesitation in submitting this suggestion to the meeting.

Mr. J. N. Langley (South Staffordshire Association) remarked that there was no difference of ages with respect to the two grades. The decision was left to the candidate whether he should go into the higher or lower; consequently, a great number went for the lower who ought to go in for the higher grade. What the Association he represented proposed was, that the same papers and the same subjects should be given to both grades. For the harder questions a higher number of marks should be given than for the easier ones, and thus the examiner would have no difficulty in awarding certificates, which might be of two or three grades, as in the Oxford and Cambridge Local Examinations, each grade being decided by the number of marks. He thought this plan would tend to improve the efficiency of the examinations, and help the masters of the schools in preparing their classes for examination.

Rev. John Oakley thought, if they were going to start *de novo*, this might perhaps be the best plan, but he doubted the policy of making a change now.

Mr. Chester thought it undesirable to be constantly changing their plans.

Mr. Sales was of opinion that it was exceedingly inexpedient to alter the present system of Elementary Examinations. Many Institutions insisted upon all candidates taking the lower grade examination this year. They considered it was suited to them, as leading them gradually up from the day schools to the Final Examinations of the Society. They gave no prizes to the lower grade candidates, therefore the question of prizes did not arise. Then, having gone through the lower grade examination, they were passed to the higher grade next year, and consequently they had the benefit of two years' instruction. It was desirable to connect them for two years with the Institutions rather than allow them to pass through at once. Therefore, he said, seeing that the present scheme appeared to work well, unless some good reason could be assigned for changing it, which he thought had not yet been assigned, he thought it highly inexpedient to make the proposed change.

Mr. Benjamin Shaw, as Chairman of the Metropolitan Association for the Education of Adults, conceived this proposition would affect that Institution materially. It appeared to him it was striving after a perfect system with a loss of practical utility. Those who were acquainted with the labouring classes of society knew that the mere mention of their going up for examination often created the greatest fear in their minds, and if they had but one set of papers containing a certain number of questions of an advanced order, as well as the easy ones, the lower class of candidates would look at those difficult questions and be terrified, and thus the object the Society had in view, of attracting such persons to be examined, would be defeated. They should have the simplest possible elementary examinations for the lower grade, so as to get the pupils familiar with examinations. The only means by which they could hope for success in this direction was by gentle steps to lead them on to the more advanced system, which would be for their benefit. He therefore hoped they would not surround the examinations with fresh terrors. He believed that his friend Mr. Chester (who had then left the room) agreed with him as to the inexpediency of the change proposed.

Mr. Marcus was sorry to differ from Mr. Talbot. He thought there was an advantage in the gradation of the papers, and the present system tended to keep the students connected with the Institutions for a longer time than they probably would be, under the alteration

that was now proposed. It was not a good thing that they should pass hurriedly into the Final Examinations.

Mr. LARKINS said that if they made the Elementary Examinations more difficult than they were at present, it would reduce the number of candidates, both in those and the Final Examinations. He knew seven or eight Institutions where the greatest difficulty was experienced in getting people to go up for the simplest Elementary Examinations. He was decidedly against the proposed change.

Mr. LAWTON remarked that for the last three years they had done their best in his Union to make the public acquainted with the Society's scheme of Elementary Examinations, and the members of Institutions and Local Boards were now beginning to understand it. That scheme had worked well, and he should be sorry to see any change made in it.

Mr. HELLER also spoke against the proposed alteration of system.

Mr. F. TALBOT said this subject had been placed on the list at his suggestion, but he saw the feeling of the Conference was against the proposition. He was not surprised at that, because they naturally disliked change. He had taken some interest in the working of this scheme, having been present at its birth, and had seen a great deal of its practical working. He had found great difficulty in the schools of South Staffordshire, particularly where they were under the charge of one teacher only. That teacher wished to send up scholars in the two grades, and he found it difficult to do so. It might be that the first class consisted of not more than a dozen boys, and he was obliged to divide that class in order to give instruction in the two sets of questions. This appeared to him to be a great waste of time, and it was important, especially in night schools, to economize time as much as possible; and it occurred to him that the whole difficulty might be met by having only one set of papers for both grades, instead of two as at present. He had observed some of the questions in the lower grade papers were quite as difficult as those in the higher grade. He did not see that any practical difficulty would arise out of this proposition, and though the feeling of the meeting was so much against it that, with the sanction of Lord Lyttelton, he would withdraw it, yet he thought the time would come when they would see that the practical difficulties to the teachers in night schools would be very great, and they must eventually come to some such change as he had proposed.

WHETHER ANY STEPS CAN BE TAKEN BY THE SOCIETY OF ARTS, IN ORDER TO PREVAIL UPON THE SCIENCE AND ART DEPARTMENT TO GRANT HONORARY TEACHERS' CERTIFICATES TO THOSE GENTLEMEN WHO SHALL BE RECOMMENDED BY ANY PUBLIC EDUCATIONAL BOARD?

Dr. WATTS remarked that his object in putting this subject on the paper was to ask the Science and Art Department to accept teachers of science classes who had not passed their examinations, and also to grant certificates to known competent men, who had not sat at the examinations of the Department. Some alterations had lately been made. The science payment was on results, and, if the Government paid on results alone, what did it matter whether the teaching was given by a man who held a certificate or by one who did not? The teaching was done, and should be paid for. As he had said, there had been some alteration, which he believed allowed persons who did not hold a science certificate to get payment on results; but at the same time there was value in the certificates, and, therefore, he thought it advisable that men of known scientific reputation should have granted to them the certificate of the Science Department without passing its examinations. In the Union with which he was connected they had found a difficulty in this matter. There were gentlemen who had for years successfully conducted science classes, who would not submit to go up to London to pass these examinations. He thought some alteration in this respect was now called for.

THE CHAIRMAN believed the certificate of Oxford or Cambridge, or that of the Government School of Mines, was accepted by the Department. He presumed Dr. Watts would not go to the length of saying the teachers should have no certificate at all?

Dr. WATTS would even press that point. He thought if the new system were that of payment on results, the results should be sufficient, whoever the teacher might be, or however the results were produced. Still, there was an advantage in holding the certificate of the Science and Art Department.

Lord LYTTELTON said it struck him as unusual that a body having examinations of its own should grant certificates upon the examinations of other bodies.

Mr. LAWTON remarked that the difficulty of the thing was increased, inasmuch as the November Examinations of the Department had been done away with, and anyone desirous of obtaining a teacher's certificate must sit at the May Examinations. Consequently, those who could not afford to go up to these examinations, and who did not hold a university degree, could not act as recognised science teachers. In his own Union there were as many as 40 science schools, in one of which there were 200 pupils in one class; but the Department did not recognise their teachers.

Lord LYTTELTON thought it desirable that the public educational boards, upon whose recommendation the certificate of the Department should be granted, ought to be defined.

Mr. LAWTON said such as the Society of Arts, or the Lancashire and Cheshire, or the Yorkshire Union, would be competent bodies from which the recommendations could proceed.

Mr. REYNOLDS apprehended that certificates would be of little value when granted without actual examination and on recommendation only.

Mr. ISELIN (Government Inspector of Science Schools) thought the Department had been a little hardly dealt with in the remarks that had been made on this subject. It was more liberal than Mr. Lawton and others gave it credit for. He believed any person holding a diploma or any other public testimonial of ability in science could receive payment upon the results of his teaching. The Department, he was convinced, would deal liberally with parties producing such proofs to them.

Mr. SALES remarked that it would be more simple if the Department would say that on the results of the examinations payment should be made, whether the proficiency had been acquired by private study or by contact with a teacher, without fettering the latter with the requirement that he should be the holder of a certificate. They were aware that to sit at the examinations of the Science and Art Department was not the sole test of a man's fitness to be a teacher in those branches, and he might come out of the examination lower than others in a subject which he was nevertheless perfectly competent to teach. They were in want of more science teachers, and no doubt they would be provided but for the restrictions in respect of the certificates which now existed.

The CHAIRMAN thought perhaps there might be sufficient reasons for insisting upon the certificates. One object might be to get a number of persons to prepare themselves by a long course of study for the conduct of these classes. The certificate granted to them was not only proof that they had prepared themselves, but it became of money value. He thought it was important to maintain the certificates for the purpose of inducing a great number of persons to train themselves for the position of masters of Science and Art Schools. It had not fallen to him to have to consider this question to any extent; he had considered the educational question, and on that his opinion was decidedly in favour of certificates.

After a further conversation the subject was withdrawn.

Upon the last subject on the paper, viz.:—

HOW CAN THE INSTITUTIONS OR DISTRICT UNIONS ASSIST THE MOVEMENT NOW BEING MADE BY THE SOCIETY OF ARTS TO SEND SELECTED WORKMEN TO EXAMINE AND REPORT UPON THE PARIS EXHIBITION?

no observations were offered.

Dr. WATTS then proposed a cordial vote of thanks to Mr. Bruce for his kindness in attending the Conference, and for the able and courteous manner in which he had presided over the proceedings.

This was seconded by Lord LYTTELTON, and carried by acclamation.

ANNUAL GENERAL MEETING.

The Annual General Meeting, for receiving the Report from the Council, and the Treasurers' Statement of Receipts, Payments, and Expenditure during the past year, and also for the Election of Officers, was held, in accordance with the Bye-laws, on Wednesday, the 26th inst., at four p.m., WILLIAM HAWES, Esq., Vice-President of the Society, in the chair.

The CHAIRMAN, before entering upon the business of the meeting, desired to express the sincere regret he felt, and that felt by every member of the Council—and he might say by every member present—that it became his duty to preside over the meeting this day. During the long period he had enjoyed the friendship of Sir Thomas Phillips, he had fully appreciated his generous and kindly character; and his death left a blank in the Council of the Society which it would be difficult adequately to supply.

The Secretary having read the notice convening the meeting, the minutes of the last Annual General Meeting, and of the subsequent Special General Meeting, were read and signed.

The Chairman then nominated the Rev. James Spong and Mr. O'Hagan as scrutineers, and declared the ballot open.

The Secretary then read the following

ANNUAL REPORT OF THE COUNCIL.

In compliance with the Bye-laws, the Council now lay before the Society a statement of their proceedings during the past year. Before, however, they enter upon the general business of the Society, they desire to express their deep concern for the loss which the Council and the Society have sustained in the death of their Chairman, Sir Thomas Phillips. The long period during which he presided over their deliberations, elected by the unanimous voice of his colleagues, is in itself unmistakable testimony of the estimation in which he was held by them. His business-like habits, his honest zeal and earnest exertions on behalf of the Society, his thorough appreciation of its objects and interests, combined with rare integrity of mind and genial good temper, rendered him especially qualified for the office he held, and the Society will not readily supply his loss.

ART-WORKMANSHIP PRIZES.

The Council have much satisfaction in recording a considerable advance in the response made this year by competitors for these prizes, the numbers being 109, as against 61 of the previous year. The advance, moreover, is not merely in numbers—the quality of the works sent in surpasses that of any previous year, and the judges, Messrs. R. Redgrave, R.A., and Mr. Digby Wyatt, in their report bear pleasing testimony to this fact, and express their gratification in recognising that the encouragement given by the Society "to the improvement of Art-Workmen in so many departments of skilled industry is at length bearing fruit." In the competition this year, liberty was given to artizans to exhibit works after other designs than those prescribed in the classes enumerated in the first section of the programme. Many have availed themselves of this relaxation of the conditions, and very highly creditable work has been sent in. The judges, in speaking of this department, after giving high praise to many of the works, "congratulate the Society upon the institution of this section, and upon the results of its action in this respect." The amount of prizes awarded this year has been £182 8s. 8d. as against £174 last year. In carrying on this work the Society has been again assisted by the Worshipful Company of Salters, who contribute annually £10 to the Prize Fund, and this year the Worshipful Company of Clothworkers also contribute £10, and the Worshipful Company of Goldsmiths have signified their intention to aid the Society by offering prizes of £10 and £5 for the encouragement of workers in the precious metals. A selection of the prize works of the competitors is now being exhibited by the Society at the Paris Universal Exhibition. The Council have decided to continue their offer of prizes in this department, and, under the advice of a Committee, have issued a revised list for the current year.

MEDALS.

The Albert Medal has this year been awarded to Mr. W. Fothergill Cooke and Professor Charles Wheatstone, F.R.S., in recognition of their joint labours in establishing the first Electric Telegraph.

It will be remembered that the first Albert Medal was awarded, in 1864, to Sir Rowland Hill, K.C.B., "for his great services to Arts, Manufactures, and Commerce, in the creation of the penny postage, and for his other reforms in the postal system of this country, the benefits of which, have, however, not been confined to this country, but have extended over the civilised world." The second medal was awarded, in 1865, to His Imperial Majesty the Emperor of the French, "for distinguished merit in promoting, in many ways, by his personal exertions, the

international progress of Arts, Manufactures, and Commerce, the proofs of which are afforded by his judicious patronage of Art, his enlightened commercial policy, and especially by the abolition of passports in favour of British subjects." The third medal was awarded, in 1866, to Professor Faraday, D.C.L., F.R.S., for "discoveries in electricity, magnetism, and chemistry, which, in their relation to the industries of the world, have so largely promoted Arts, Manufactures, and Commerce."

The Council think it right to remind the members of these several awards, in order to keep in their recollection the very high standard of merit which they are intended to mark.

In making the award this year, the Council were placed in a somewhat peculiar position, inasmuch as by the terms upon which the medal was established they could only make one award, whilst the great object accomplished was due to the combined labours of two men. They felt, however, that so great a national work as the Electric Telegraph was especially worthy of reward by this Society, and that the Albert Medal could not be more worthily bestowed than in recognition of the services of those to whom the introduction of the Telegraph was due. The award having been made, they have directed that the medal be struck in duplicate, and a copy, with a suitable inscription, be presented to each of the above-named gentlemen. The Council feel assured that in selecting the introduction of telegraphy for the award of the Albert Medal, they will have the unanimous concurrence of the members of the Society.

The Council have awarded the Society's Silver Medal to James Fergusson, Esq., for his paper "On the Study of Indian Architecture;" to Clements R. Markham, Esq., for his paper "On the Tinnevelly Pearl Fisheries;" and to S. J. Mackie, Esq., for his paper "On the Construction of Iron Ships, and their Preservation from Corrosion and Fouling by means of Zinc Sheathing." All these papers were read at evening meetings of the Society.

Harvesting Corn in Wet Weather.

The effect of the last year's wet season upon the harvest drew the attention of the Council to the importance of something being done, if possible, to obviate or mitigate the injury which the public suffer from this cause. After consultation with, and under the advice of, a committee of gentlemen skilled in agricultural pursuits, the Council determined to offer the Gold Medal of the Society, and a Prize of Fifty Guineas, for the best Essay on the Harvesting of Corn in Wet Seasons.

The first part of such essay—after noticing the various systems at present adopted in damp climates for counteracting the effects of moisture upon cut corn in the field, and for avoiding such exposure in wet seasons by peculiar harvesting processes—should furnish a practical and analytical exposition of the best available means:—

1st. Whereby cut corn may be protected from rain in the field.

2nd. Whereby standing corn may, in wet seasons, be cut and carried, for drying by artificial process.

3rd. Whereby corn so harvested may be dried by means of ventilation, hot air, or other methods; with suggestions for the storage both in the ear and after thrashing.

4th. Whereby corn, sprouted, or otherwise injured by wet, may be best treated for grinding or feeding purposes.

The whole to be supplemented by a statement of practical results, and the actual cost of each system described; and by authenticated estimates of any process proposed for adoption, based on existing, but uncompleted experiments.

These requisitions are given suggestively; and are not intended to bind the writer to the order or to limit the treatment of the subject, provided it be kept within the scope of practical experience and utility.

The essays are to be sent in to the Secretary on or before the 1st of January, 1868.

The Council reserve the power to withhold the whole or part of the prize, in the event of no essay being, in the opinion of the judges, of sufficient merit.

Food Committee.

Early in the Session the Council resolved "that a Committee be appointed to inquire and report respecting the food of the people, especially, but not exclusively, the working classes of the people; and that, having regard to the publications of the Privy Council and other documents, which illustrate the defective amount of nutritious food available for the population at large, the said Committee do report respecting the resources which are, or might be rendered, available for the production, importation, and preservation of substances suitable for food, and for improving the methods of cooking in use among the working classes." This Committee, under the chairmanship of the Right Hon. H. A. Bruce, M.P., has held many meetings, very fully attended, and has diligently prosecuted its inquiries; the evidence which has been given before it has been published from time to time in the *Journal*. The Committee, in their first report to the Council state:—

> By the terms of their appointment, they were "to inquire and report respecting the food of the people, especially, but not exclusively, the working classes of the people," and they were instructed "to report respecting the resources which are or might be rendered available for the production, importation, and preservation of substances suitable for food, and for improving the methods of cooking in use among the working classes." The Committee feel that much of their task remains uncompleted owing to the shortness of the time during which

they have been at work as compared with the extent of the inquiry, and they therefore beg strongly to recommend that they should be allowed to continue their labours, and should not be considered as making in any sense a final report.

After careful consideration of the points to which their investigation should be directed, they appointed four Sub-Committees; one on meat, one on milk, one on fish, and one on the subject of the cooking and cooking utensils in use among the working classes with a view to their improvement.

On the first of these subjects much evidence of various kinds has been taken, and much information received, both from scientific and practical men, but as the substance of this has appeared from time to time in the *Journal*, it is not deemed necessary to recapitulate it here.

The Committee divided this branch of their inquiry into

(1) The transport of live stock and of meat in a fresh condition.

(2) The methods of preserving meat, with a view to its importation from a distance.

On the former head, they are not at present prepared to make any distinct suggestions, but they are not without hope that they may be able to do so hereafter if their inquiries are continued.

Under the latter head, they have examined various plans, but the only one by which they have as yet found that unsalted meat in a solid eatable condition has been largely imported, is that followed by The Australian Meat Company. The process is that long used for preserved provisions. The beef arrives in tins from which the air has been excluded, and, from the heat employed, is sufficiently cooked to be eaten without further dressing. It may, however, be stewed and served hot, if preferred, and is fairly palatable. The Committee would suggest that to render it more valuable, the proportion of fat should be diminished, and the temperature of preparation kept down to the lowest limit compatible with perfect preservation. It is at present supplied to the public at the rate of 7d. per pound, retail price.

The extract of meat manufactured according to Liebig's process may be fitted for use in special circumstances, but does not seem suited to form a substantive article of food.

The Committee would add, however, that a specimen of dried and powdered beef from Queensland has been laid before them, prepared by Mr. Alexander, of Brisbane, in that colony; and they are taking means to obtain a larger supply for the purpose of a more complete examination. The sample, though sent over from Queensland in a common canvas bag, and thus fully exposed to variations of temperature and the action of the atmosphere, was perfectly sweet and fresh; while the analysis by Dr. Voelcker and Professor Taylor showed that it possessed, in all material points, weight for weight, four times the nutritive properties of ordinary butcher's meat. Unfortunately, no evidence is at present attainable as to the price at which it could be sent to this country, a point which would, of course, materially affect its value as an article of general consumption.

Professor Gamgee, also, has drawn attention to a peculiar method of killing animals, by which he maintains that their flesh may be preserved much longer than if slaughtered in the ordinary way. The Committee have gone into the subject with much care, and have witnessed some experiments; but they are not at present able to express any opinion on its merits. They think that further and more lengthened trials would be desirable.

The same remarks apply to Mr. Sloper's process for preserving meat by enclosing it in tins filled with a gas of particular properties. One successful example has come before them, but they cannot speak decidedly, without further experiments.

Coming to the subject of milk, the attention of the Committee has been much directed to the supply of country milk to London, which has very largely increased during the last two years, and is likely to do so still more. The chief difficulty arises from the imperfect means of conveyance, which are open to much improvement, and the Committee recommend the adoption of the French system in the construction of the milk cans, with corresponding alterations in the railway vans. The French cans are much smaller, and more easily moved about, and as they are quite filled with milk, and the opening is carefully closed with a close-fitting stopper, the milk is less shaken than in the large imperfectly-filled cans used in this country. It would be well if railway companies could be induced to insist on the use of such cans, at all events when a new district of country begins to take part in supplying milk to the metropolis.

Could milk be supplied in larger quantities and at a cheaper rate from the country to our large towns, a valuable means of nourishment would be open to all, especially to the young, who often suffer seriously in health from the want of it.

On the subject of fish the Committee have an important recommendation to make to the Council, on which they lay much stress. Their inquiries have of late been limited to a few points only, but evidence brought before them shows that fish forms a most important article of food, much sought after by all classes. The demand for it is sufficient to absorb any increased supply that can be obtained, and the means of distribution, although capable of great improvement, are, even at the present time, such as will place the commoner kinds of fish within the reach of the working classes at a very reasonable price. It further appears probable that the fisheries of this country might be developed very considerably if a greater amount of capital, skill, and energy were devoted to them.

Hence the Committee suggest that, to attract public attention to this subject, the same means should be used which have been employed in Austria, France, Sweden, Norway, Denmark, and Holland, and that an International Fishery Exhibition, similar to those which have been held in the countries just mentioned, should be set on foot in England. The fact that the one now taking place at the Hague is the second which has been held there, seems conclusively to show that the results have been found to be beneficial.

The unrivalled capabilities of this seagirt country, and the importance of increasing its supply of nutritious food, seem alike to indicate that England is deeply interested in following such examples; if, indeed, she should not have taken the lead of other nations.

It would appear that the utility of such exhibitions suggested itself to the Commissions on the Sea Fisheries of the United Kingdom, though they rather contemplated the promotion of them by the efforts of a special society. They say, in their Report:—"When we consider the amount of care that has been bestowed on the improvement of agriculture, the national societies which are established for promoting it, and the scientific knowledge and engineering skill which have been enlisted in its aids, it seems strange that the sea fisheries have hitherto attracted so little of the public attention. There are few means of enterprise that present better chances of profit than our sea fisheries; and no object of greater utility could be named than the development of enterprise, skill, and mechanical ingenuities which might be elicited by the periodical exhibitions and publications of an influential society specially devoted to the British fisheries."

The Committee intentionally abstain from going into any details, being persuaded that the labours and experience of the Council, in connection with the great international exhibitions, render it the fittest body in the country to originate such a design, and to suggest the proper steps for its successful execution.

In relation to the subject of cooking, there is at present but little to report. The Sub-Committee have had several meetings, but as they found that an officer of the Royal Engineers was directing his special attention to the various kinds of improved fire-places and cooking utensils exhibited at the Paris Exhibition, it was thought best not to proceed with the subject (of which they fully recognise the importance), until they were in possession of the information which will no doubt be derived from any report that he may make.

The attention of the Committee has been so taken up by these four subjects, that they have been unable to make any inquiries upon other points equally important, viz., cereals and other vegetable food generally; fermented and unfermented beverages; combinations for the preparation of food; and the very momentous one of adulterations and other frauds in the sale of food. Through the kindness of Lord Stanley, they have received documents relating to the laws of foreign countries on the last-named question, upon which further legislation appears to be needed in this country.

They desire also to call the attention of the Council to the bearing of the investigations of M. Mège Mouries on the bread-food supply of the people. The results of his investigations into the preparation of wheat flour, and the processes of panification, have already been given in detail in a recent number of the *Journal* (May 10, p. 394). An improvement upon existing practices, based on sound philosophical principles, which adds not only to the quantity, but also to the nutritive quality of the available produce of such an important article of daily food as wheat flour, appears to the Committee to be worthy of public recognition by the Society of Arts, and of being carried out into practical existence. The separation of the *true bran* from the grain does not appear to present much mechanical difficulty; while any prejudice that might at first exist against the colour of bread from flour thus prepared would gradually disappear as its superior quality and economy became known.*

The Council does not doubt that the great importance of the subject of the food of the people will be recognised by the new Council now to be appointed, and that they will renew the appointment of the Food Committee. With regard to the recommendation that an Exhibition of Fishery Appliances should be held in this country, the Council have requested a Special Committee to consider and report what steps can be taken to practically carry it into effect.

Cantor Lectures.

Two courses of these lectures have been given during the Session, one by Mr. Chaffers, on Pottery, and one by Mr. Hullah, on Music. In both cases, as the courses proceeded, it became necessary to extend the number of lectures beyond that originally contemplated. Full abstracts of these lectures have appeared in the Society's *Journal*. The information on subjects connected with the objects of the Society, thus imparted to the public by men eminent in their several specialities, and the interest which the members take in them, fully justify the Council in the establishment and in the continuance of these lectures, which may be considered now as a settled part of the Society's operations.

* The Council have since learnt that M. Mège Mouries' process has been for several years past, and is at the present time, in actual operation on a large scale at the "Usine Municipale de Scipion," at Paris. About 25,000 kilogrammes of bread, equal to 13,000 to 14,000 quartern loaves, are made daily at this establishment. The quality is excellent, and its nutritive properties practically proved.

Fine Art Copyright.

The Council have again this year endeavoured to procure an amendment of the laws relating to Copyright in Fine Art. With this object in view they have had a Bill carefully prepared for consolidating and amending the law, which at present is in a very unsatisfactory condition, and wholly inadequate to repress the piracies which seem daily extending, to the injury alike of artists, purchasers, and publishers. The Council sought the aid of the Government to bring in and prosecute their Bill in Parliament. The state of political matters in the House of Commons caused considerable delay in obtaining the decision of the Government; and has rendered it necessary to postpone any further attempts at legislation till the next Session of Parliament. The following is the reply to the Society's application:—

Office of Committee of Privy Council for Trade,
Whitehall, 8th May, 1867.

Sir,—Lord Derby having referred to this department a draft bill, which has been prepared by direction of the Council of the Society of Arts, for consolidating and amending the law of copyright in works of fine art, I am directed by the Lords of the Committee of Privy Council for Trade to state to you, for the information of that body, that after a careful consideration of the proposed bill, they do not think that its provisions are on the whole such as would tend to produce a satisfactory measure of legislation.

My Lords are of opinion that, in dealing with this question, it would be desirable that any proposal which might be submitted for the consideration of Parliament should not be limited in its operation to works of fine art only, but that, having in view the existing state of the laws with regard to copyright generally, it would be expedient that such a measure should embrace the entire subsisting copyright laws of the United Kingdom.

The question of the amendment of these laws has for some time occupied the attention of Her Majesty's Government; but my Lords are not prepared, under the present circumstances, and considering the advanced period of the session, to undertake to deal with the subject this year.

It also appears to my Lords that it would probably be necessary to institute further investigations, with a view to ascertain the special points upon which legislation is most requisite, and it will therefore be a matter for consideration whether this object could not perhaps be best attained by the appointment, in the early part of the ensuing session, of a select committee of either House of Parliament, to consider the whole question of the consolidation and amendment of the laws of copyright.

I am, Sir,
Your obedient servant,
Robert G. W. Herbert.

P. Le Neve Foster, Esq., M.A.,
Society of Arts, John-street, Adelphi.

Memorials of Eminent Men.

The Committee in charge of this subject have had tablets prepared for the purpose of marking the spots where eminent men have lived and died (as referred to in last year's report), and the work has been commenced by placing a commemorative tablet on the house where Byron was born, in Holles-street, Cavendish-square.

Tablets are about to be affixed as follows, leave having been obtained from the respective owners, viz.—3*a*, King-street, St. James's, occupied by H.I.M. the Emperor of the French when in this country; 141, New Bond-street, on the house in which Nelson resided previous to his departure for Trafalgar; 47, Leicester-square, the residence of Sir Joshua Reynolds; 7, Craven-street, Strand, where Franklin lived; and 36, Castle-street, Oxford-street, where James Barry had his abode.

Artizans' Visits to Paris.

The following minute, which has been passed by the Council, fully explains their action in reference to this object:—

At the last and former International Exhibitions held in this country, arrangements were made by the French Government, to facilitate the visits of skilled artizans, and interesting reports on the exhibitions were made by them to their government. Believing that such visits on the part of skilled workmen to these great international displays not only exercise a beneficial influence upon the men themselves, but also upon the progress of industry in the country to which they belong, the Council of the Society of Arts have resolved to raise a fund, to be employed in aiding a limited number of English workmen to proceed to Paris for the purpose of studying the present French Exhibition.

To carry this object into effect, they have agreed on the following plan:—

1st. That a number of selected workmen (the number to depend on the amount of funds at the disposal of the Council) shall be assisted to proceed to and remain in Paris a sufficient time (say three weeks), for the purpose of making a careful study of the exhibition, and of such factories and workshops as they may desire to visit.

2nd. That every man so assisted shall, on his return, make a report to the Society of what he has observed during his stay, in reference to the special industry in which he is engaged, and that it be made a condition of the grant to each man that one-third of the amount be retained until his report shall be supplied to the Society.

3rd. The Council think it will be undesirable to fix the exact time for, or to prescribe the duration of, these visits, or to interfere with any of the arrangements the men may desire to make for their own accommodation; but, in order that they may take advantage of the facilities provided by the Commission organised by the French Government for the study of the exhibition, the men will be placed in communication with that Commission on their arrival in Paris.

4th. A considerable sum will be required satisfactorily to accomplish the important object undertaken by the Society, and, in order to raise these funds, the Council have determined to appeal to the members of the Society, who must be interested in the successful results of this movement, in the belief that they will not hesitate to join in a subscription for the furtherance of the undertaking; and they propose at the same time to communicate with the various Chambers of Commerce, inviting their counsel and support. The Council have decided to commence the subscription by a vote of one hundred guineas from the funds of the Society.

The Council trust that the members will aid them in this matter and enable them to carry out on a sufficiently extended scale the important object they have in view. They have the pleasure of stating that H.R.H. the Prince of Wales, as the President of the Society, has shown his hearty sympathy with the undertaking by subscribing thirty guineas to the fund, and many members have already signified their intention to join in the subscription. The list has already appeared in the *Journal*. It is proposed that these visits shall commence after the 1st of July, when the awards of the juries will have been publicly announced. An officer (Col. Ewart, R.E.) has been specially appointed by Her Majesty's Commissioners, whose duty it will be to give all necessary aid to the workmen on their arrival in Paris.

Musical Education.

The Committee in charge of this subject have made two reports to the Council, which have been published at length in the *Journal*. In these reports the Committee point out that a National Academy should afford gratuitous education to a limited number of persons having great musical gifts, who, after proper training at the public expense, would engage to devote their talents to the service of the public as professors of the art of music, and that the form in which Parliamentary assistance could be best afforded would be by scholarships, which should be held by candidates who, in open competition, had proved that they are endowed with the gift of musical ability.

The Committee also express an opinion that besides the training of free scholars, the Academy should be open to the public at large on the payment of adequate fees; and, as soon as the institution shall have obtained public confidence, the cathedrals and various other corporations will (it is hoped) provide the means of sending to the Academy young persons of musical genius; and the Committee recommend that the Society of Arts should itself set the example of such endowments by establishing a limited number of scholarships.

The Committee consider that, before Parliament can be asked to increase its present vote to the Royal Academy of Music, the Academy should provide, through the voluntary aid of the public, permanent and suitable premises, possessing all requisite facilities for practice and study; but probably three years must elapse before they can be built even after the funds are obtained. In the meantime, the Committee consider that every effort should be made by the Academy to enlarge its basis of action, and to establish an effective system of responsible administration. When the public are satisfied with the promise of an efficient Academy, it may be expected that they will contribute towards the erection of suitable premises.

The Committee draw attention to the fact that the Royal Academies of Music of Paris, Brussels, and Naples, being instances of highly successful institutions, present useful suggestions for the re-organisation of the Royal Academy of Music. In these Academies a considerable number of students are educated gratuitously,

and the Committee consider that at present about two hundred students might be fixed as a proper number to receive gratuitous training at the Royal Academy, and that of this number one hundred, selected by public competition, should be supported by public funds disbursed under ministerial responsibility, the remainder if possible by colonial, municipal, or other corporate funds, and by private endowments and subscriptions. Arrangements should then be made to allow about 100 private students in addition to enter and pay adequate fees for their instruction. As far as the Committee are enabled to judge, they consider that the cost of properly training two hundred free students would be about fifteen thousand pounds sterling a year.

The Council have had these reports under their consideration, and have expressed their willingness to establish experimentally, in connexion with the Academy, for a limited period, four Free Scholarships of £50 a-year each, for the study of vocal and instrumental music, to be called the Society of Arts Scholarships, provided that the Royal Academy be placed in a permanent and efficient position, in accordance with the reports of the Committee.

Institutions in Union.

The Council congratulate the Society on the very great progress which has been made in the examinations connected with this branch of the Society's operations; and they refer to the Secretary's report, read at the Conference of Institutions on the 19th instant, for the details connected with them.

It will be seen that there has been a very large increase in the number both of the candidates examined in the Final Examinations, and of the places at which these examinations were held; that the examiners have, with very few exceptions, reported most favourably respecting the character of the papers referred to them; that there has been some increase in the number of female candidates who have obtained certificates; that a larger amount of prizes has been carried off than in any previous year; that those prizes have been obtained by candidates in all parts of the United Kingdom, viz., Aberdeen, Belfast, Bromley, Chatham, Chelmsford, Deptford, Devonport, Glasgow, Halifax, Huddersfield, Leeds, London, Manchester, Pembroke Dock, Portsmouth, Richmond, Rugby, Slough, Southampton, West Bromwich, and Wolverhampton. The Society has had the advantage of the co-operation of the Royal Horticultural Society and the Royal Geographical Society, of the proprietors of the *Gardeners' Chronicle*, and of certain City Companies, viz., the Goldsmiths and the Coach and Coach-harness Makers; and this co-operation is likely to be extended and to have an important bearing on the examinations in future years.

The Elementary Examinations, which are conducted, not by the Society of Arts itself, but by the Institutions and District Unions connected with the Society, and are important auxiliaries to the Society's system, have been conducted this year with great success, and on a very much larger scale than in previous years; and on a review of the whole subject, the Council can cordially congratulate the Society on the success of its endeavours to improve the education of the working classes, though much still remains unaccomplished, and the great object of technical instruction demands the best attention of the new Council.

Finance.

The balance-sheet and statement of the financial condition of the Society have been published in the *Journal*, in accordance with the Bye-laws, and show the satisfactory position of the Society's pecuniary affairs. The Society commenced its new lease at Lady-day last; and the items of the balance-sheet show a larger balance at the Society's bankers, and a smaller amount of liabilities as compared with the corresponding period last year, whilst the sum of £200 has been added to the Society's investments. The annuity of £25, which the Council have for some years paid to Mrs. Cantor, the mother of the late Dr. Cantor, has lapsed, by the death of that lady, which took place at Copenhagen in January last.

The Chairman asked whether any member present desired to offer any observations upon the report which had just been read?

No member having responded, the Chairman then put to the meeting that the report be received and adopted, which was carried.

The Chairman said he had received a letter from a member, touching upon various matters connected with the Society, but as the letter was not signed, he thought that as a matter of principle it would not be desirable to read it, although he might observe that it contained nothing in any way objectionable, but the contrary. If, however, the writer would send in his name, he was sure the letter would have the best attention of the Council. It had, he believed, been sometimes asserted that the Cantor Lectures acted unfavourably, in lessening the attendance at the Wednesday evening meetings, and also that these lectures had not this year had such large audiences as formerly. With regard to the first assertion, his own observation and the information he had received from others led him to doubt its correctness. Possibly, with regard to some of the Cantor Lectures this year, there might be some truth in the latter statement, but certainly the information given in them was most valuable, and he thought they were generally appreciated by the members. With regard to the statement of accounts which had been laid before them, he thought it was now in as perfect and clear a form as possible, and for this they were in a great degree indebted to the auditors, especially to one of them, who in a former year had pointed out objections to the form then adopted, and had since kindly accepted the office of auditor, and given up much valuable time to the duties of that office.

Professor Tennant suggested that it would be interesting to members if short descriptions of the fine pictures adorning the room in which they were

assembled were published in the *Journal*. He might mention, with reference to the proposed visit of the members to Paris, that the Geological Society of France would probably hold a meeting there at the end of July.

The ballot having remained open one hour, and the scrutineers having reported, the Chairman declared that the following members had been elected to fill the several offices. The names in *italics* are those of members who have not, during the past year, filled the offices to which they have been elected :—

COUNCIL.

PRESIDENT.

H.R.H. the Prince of Wales, K.G.

VICE-PRESIDENTS.

W. H. Bodkin (Assistant-Judge).
Sir J. P. Boileau, Bart.
Right Hon. H. A. Bruce, M.P.
The Duke of Buckingham.
Harry Chester.
Henry Cole, C.B.
Lord de l'Isle and Dudley.
J. P. Gassiot, F.R.S.
The Earl Granville, K.G., F.R.S.
William Hawes.
C. Wren Hoskyns.
Lord Henry G. Lennox, M.P.
Lord Lyttelton.
The Duke of Marlborough.
Right Hon. Sir John S. Pakington, Bart., M.P.
The Marquis of Salisbury, K.G.
Sir Francis Sandford.
Thomas Twining.
Vice-Chancellor Sir Wm. Page Wood, F.R.S.
The Archbishop of York.

COUNCIL.

John Bell.
Professor Bentley.
D. Roberton Blaine.
Antonio Brady.
Sir Daniel Cooper, Bart.
John Bailey Denton.
Samuel Redgrave.
R. P. Roupell, Q.C.
Col. Scott, R.E.
Benjamin Shaw.
D. H. Stone, Alderman.
Geo. F. Wilson, F.R.S.

TREASURERS.

Seymour Teulon.
Philip Wright.

AUDITORS.

Samuel Andrews.
John Murray.

SECRETARY.

Peter Le Neve Foster, M.A.

FINANCIAL OFFICER.

Samuel Thomas Davenport.

At the conclusion of the General Meeting a Special Meeting was held, when the following candidates were balloted for and duly elected members of the Society :—

Aiton, John, 12, Elvaston-place, South Kensington, S.W.
Asprey, Charles, jun., 166, New Bond-street, W.
Barker, J., 5, Birchin-lane, E.C.
Blomfield, Arthur William, 8, Adelphi-terrace, W.C.
Byass, Robert B., Nevill-park, Tunbridge Wells.
Cross, John C., 12, Barnsbury-road, Islington, N.
Edwards, Robert, 35, Lower-street, Deal.
Girard, G. Eugene, 13, Malden-crescent, N.W.
McMillan, John, 7, Westminster-chambers, S.W.
Meeson, Alfred, 5, Westminster-chambers, S.W.
Michael, W. H., Chumley-road, Holloway, N., and 4, King's Bench-walk, Temple, E.C.
Mounsey, Ewart Simon, 5, Raymond-buildings, Gray's-inn, W.C.
Rossiter, William, F.R.G.S., Linden-villa, Tottenham, N.
Rutherford, Charles, 32, Oakley-road, Southgate-road, N.
Sykes, John, 280, Regent-street, W.

Mr. Teulon proposed a cordial vote of thanks to Mr. Hawes for his conduct in the chair, and, he might add, for all his eminent services to the Society for several years past.

Mr. Waterhouse Hawkins seconded the motion, which was carried by acclamation.

PARIS EXHIBITION.

The classes of textile fabrics are not very fully represented on the British side, but it cannot be said that they are poor; on the contrary, the opinions of intelligent and impartial foreigners appear to be decidedly favourable.

In the cotton class there are only about thirty exhibitors, but the fabrics have been greatly admired, especially what are called in the trade soft goods, that is to say, fabrics with little dress in them; broad cloth for sheeting and other purposes, in some cases more than a hundred inches wide; cotton velvets, velveteens, and fabrics of that class; and also sewing cotton, and twist for the sewing machine.

In flax goods, the United Manufacturers of Ireland and many private exhibitors make excellent shows; the catalogue contains only twenty names, but the combined national exhibition of Irish linen manufactures includes about thirty more. The damasks, linen cloth, fine fabrics, sail cloth, and other fabrics have been much admired, and the excellent manner in which most of the cases are arranged adds greatly to their value in an exhibitional point of view; in many cases the raw flax, yarns, threads, and fabrics are shown together, so as to become valuable educational as well as practical collections. Another point worthy of note as regards this class is the evidence to be found on all hands of a regular import into France; there is scarcely an important manufacturer who has not his Paris agency.

In the combed wool and worsted class there are but nine entries in the catalogue, but Bradford exhibits collectively under the head of the Chamber of Commerce, and its exhibitors must be numerous; the two Bradford cases contain a very fine collection, commencing with samples of wool of all kinds, a capital series of yarns, and an immense number of fabrics, including moreens, mohair, alpaca, lastings, Balmoral crape, camlets, princettes, mixed goods, Orleans cloth, damasks, knickerbocker, winseys, and Italian cloth.

The next class, that of carded wool and woollen fabrics, is strong both in numbers and quality; there are more than a hundred exhibitors, including the Batley Chamber of Commerce, which makes a collective exhibition of perhaps twenty firms; the thick coatings, fabrics for trousers and skirtings, flannels, railway rugs, tweeds, and fancy woollen and mixed stuffs, are certainly not to be equalled in any other department of the Exhibition, and the admirable finish of goods of low and moderate price has called forth the highest encomiums. The Scotch manufacturers come in for their full share of this admiration; the tartan shawls and other fabrics of the same class are eagerly sought by French buyers, as well as by those of other parts of the Continent; and the remark that was made above with respect to the demand for Irish and other linens will apply with quite as much force to English and Scotch woollen and mixed goods of several classes.

The British silk manufacture stands in a very different position to those of cotton, linen, and woollen; in this case we almost of necessity fill a secondary position; we exhibit our products in the very capital of silks; we "carry our coals to Newcastle;" but our silk manufacturers are in no way dishonoured; they cannot cope with Lyons in decorated fabrics, but they have specialities of their own, which cannot be overlooked; the silk velvets, and especially those with cotton backs, are admirable; there are pieces of watered silk, *moirés antiques*, from Spitalfields, which surpass in excellence and beauty the productions of any looms in the world. There is an admirable show of fancy silk scarfs, equally remarkable for solidity, good design, dyeing, and moderate price;

and there are the beautiful Irish poplins, which have never yet been equalled in any country. All these articles are now in more or less demand in Paris and elsewhere on the Continent, and the names of some of the best-known houses may be found mentioned as customers in the cases of our English and Irish exhibitors. There are two other kinds of goods in this class for which England is unrivalled, namely, crape, black and coloured, and plain and figured silks produced in the power-loom; this last is a novelty which deserves special attention.

The lace class is very well filled; the products of the Honiton and other cushions, the Irish point and other hand laces, are very beautiful, and the machine lace makers of Nottingham make a remarkably fine show. The imitation Spanish, or Pusher lace shawls, as they are called in the trade, are remarkably beautiful and in great demand in France, but the machine-made curtains have perhaps attracted more attention than anything else in this class; they are equally remarkable for improvement in design as for increased size. There are examples in the Exhibition fourteen or fifteen yards in length, and some specimens of design which deserve the highest approbation. The circular avenues in the English department are hung with lace curtains, and no decoration could possibly be more fitting or more beautiful, especially in connection as they are with simple fringe and elegant pendant lamps. Such are a few of the impressions made by a careful study of the textile fabrics on the British side of the Exhibition.

Some of the more prominent awards of the jury have been published in the journals of France and England, but such lists are not official, and probably not complete or even accurate as far as they go; we think it better, therefore, to abstain from quoting them, and await the appearance of the official list.

A paragraph, relating to the awards, which appeared a day or two ago has attracted considerable attention; the purport of it is, that with the view to rendering the decisions of the jury complete and irreproachable, a committee has been formed to make an inquiry, previous to the distribution of the awards, as to the commercial respectability of those exhibitors to whom honours have been awarded; the reason for this is given as follows:—After the two universal exhibitions of Paris and London there occurred some cases "of failure and bankruptcy, which followed so closely upon the distribution of prizes as to give rise to the supposition that they must have been foreseen and dissimulated by those interested. It is not fit that public morality should be taken by surprise; it is right to reward progress, but only that which is brought about by regular means and honest labour." It appears that a committee of revision is now at work with a view to eliminate any such cases, and that the president is M. Devnick, who has had a long experience at the tribunal of commerce.

The visits of working men are now becoming important; last week M. Duqué de la Fauconnerie, president of the Agricultural Committee of Mortagne-in-the-Orme, headed a party of 300 farmers and workmen from Perche. They left Condé-sur-Huisnes by rail on Wednesday night, and reached Paris, a distance of 87 miles, at three o'clock on the following morning, rested two hours at the model lodging-house, close to the Exhibition, then started for a steam-boat trip to the other end of Paris, returning by omnibus, and arrived at the Exhibition at half-past seven. They visited the park and the reserved garden, lunched there and left at mid-day for the agricultural annex at Billancourt, where they dined at half-past six o'clock, and reached their lodgings at about nine. On the following morning they were at the Exhibition in the Champ de Mars at seven o'clock, staid till ten at night, and then returned home; the whole cost of the trip, including three francs per head for admission to the Exhibition, was 23 francs for the leaders of the expedition, and 20 francs for their workmen.

The expeditions organised by the Working Men's Club and Institute Union of London have already brought two parties of working men to Paris, the first consisting of two hundred, and the second of more than eighty men. Another party of about three hundred is expected immediately. Mr. Layard, M.P., was in Paris with the former party, and accompanied the workmen in some of their visits. The British Commission has placed a capital room at the disposal of workmen visiting the Exhibition, where they can write letters or meet each other; and, what is more important still, obtain information on many points. For this latter purpose a gentleman speaking French and English has been appointed secretary or superintendent. The French *ouvriers* who visited London and reported on the Exhibition of 1862 have also offered their services to accompany the English visitors over the Paris workshops, a delicate attention that deserves to be remembered. These delegates were delighted with the cordial reception they met with from the workmen of London, and thus show their gratitude in the most acceptable manner. A party of about sixty Italians, and some other parties of working men, have also arrived in France within the last fortnight.

A few days since the foreign delegates of the tenth group were invited to attend a meeting at the asylum for convalescent workmen, when M. Wolowski, professor of political economy, delivered an address on the *ensemble* of the Exhibition.

Two grand entertainments are talked of for the latter end of July; one given by the Imperial Commission to the members of the juries, the great prize-holders, and all the notabilities of the Exhibition; the other, a banquet to be offered by the exhibitors to the Emperor himself, who, it is said, has given a conditional acceptance.

Conferences are now being held in the hall erected in the grounds of the Exhibition for that purpose, by the Abbé Moigno, M.M. Brunnet, Rumkorff, Geissler, and other *savants*, besides lectures on music and other subjects.

The attendances at the Exhibition vary greatly, but they continue to be very large; they range, at present, between 50,000 and 80,000. The arrival of the Viceroy of Egypt, and the expected coming of the Sultan, have added and will add greatly to the attractions of the Exhibition; there has, in fact, been a constant succession of distinguished guests, which shows no sign of diminution, but the contrary.

ADMISSION TO PALACES, MUSEUMS, &c., DURING THE PARIS EXHIBITION.

It has already been announced that special facilities are afforded to visitors during the entire season of the present exhibition, but every day adds some new item to the list of attractions. The palaces of the Tuileries, Saint Cloud, the Trianon, and the Château of Malmaison are open three days in the week, and those of Versailles, Fontainebleau, and Compiègne every day with the exception of Monday, unless the Emperor or Empress should be residing there.

The Imperial factories of Sèvres and the Gobelins also three times a week, the Louvre every day except Monday, the Museum of Cluny and the Ecole des Beaux-Arts every day without exception, the Sainte Chapelle and the Church of Saint Denis four times a week. The usual hours of admission are from eleven or twelve to four or five, but there are some exceptional cases. No passport, ticket, or permission is required in the case of any one of the above establishments, no fees are permitted to be taken by the attendants, and visitors may, if they please, retain their sticks or umbrellas in the Louvre or at Versailles.

The Trianon and Malmaison have been placed, under the direction of the Empress, as nearly as possible in the same state in which they were in the time of Marie Antoinette and the Empress Josephine, all the existing relics having been replaced.

The museum of arms and armour in the Château of Pierrefonds has also been opened to the public on two days of the week since the commencement of the present month.

The Prefect of the Seine has decided that the catacombs shall be open every Saturday during the period of the Exhibition to all persons who may apply to the prefecture for tickets of admission.

Lastly, Prince Napoleon has thrown open his artistic and other collections in the Palais Royal five days in the week; tickets to be had on application to the Prince's private secretary, or to the Intendant of the Palais Royal.

It may not be out of place, in connection with the above, to add that in a few days the restorations of the interior as well as of the exterior of the cathedral of Notre Dame will be completely finished. Much of the decoration of the choir, executed in the time of Louis XIV., has been replaced, including a marble group by Nicolas Coustou; the statue of Louis XIII., by Guillaume Coustou; that of Louis XIV., by Coysevox; and six statues of angels. The mosaic pavement has also been completely restored. The railings of the choir, of the time of Louis XIV., having been destroyed, they have been replaced by a new gilded iron screen bearing the cyphers and emblems of Louis XIV. and Napoleon III., and a Latin inscription describing the enclosure and decoration of the choir from 1163 to the present time. The carved stalls and other fittings and decorations have also been restored or replaced.

Fine Arts.

Colossal Statue.—M. Lequesne, a French sculptor, has just received a commission to execute a statue of the Virgin Mary nine mètres, or very nearly 30 ft., high, for the bell-tower of the sanctuary of Notre Dame de la Garde, at Marseilles. There is to be a staircase within the statue leading into the head itself, and the eyes, which will serve as windows, through which to view the prospect around, will measure 10 inches.

Art Exhibitions in France.—A society of friends of art, authorised by the authorities of Upper Savoy, announces the opening of its first exhibition of works of art, to be held at Aix les Bains, from the 10th of July to the 10th of August next, and afterwards at Chambery, from the 15th to the 26th of August; further, that the society intends to make the Aix exhibition annual, and to transport it afterwards, alternately, to Chambery and Annecy, so that the exhibition will be biennial at the latter places. This new society will not purchase any works of art, but will arrange a lottery of prizes of various amounts, leaving the winners to select their pictures after the manner of the Art-Union of London. The society undertakes the carriage of the works to the exhibition and back, and charges a commission of five per cent. on sales. A certain number of artists are invited by circular to send works to the exhibition, but others may send works, and if these are accepted by the society for exhibition the same rules will apply as to invited exhibitors. Some other items in the regulations are, perhaps, worth the consideration of local committees and other bodies. It is laid down as a positive rule that each picture shall be fixed by screws within its case; that the interior of the latter shall be painted, and its cover also fixed with screws, so that the picture may be shown within its case. There are other conditions, which may be learned of the secretary of the Société des Amis des Arts de Savoie et Haute Savoie, Aix les Bains.

Colonies.

Telegraphs in New South Wales.—The great line which is to connect the capital of this colony with that of South Australia is completed, and the superintendent of telegraphs left Sydney for Adelaide, *viâ* Melbourne, the 20th April last, to open this line. The opening of this line will be a great convenience to those who are accustomed to communicate by telegraph in both colonies, and especially to the press, as the press messages, containing the news from England by way of the branch boat from King George's Sound, have hitherto come to Sydney through Melbourne.

Rating in Victoria.—A return of the number of ratepayers in the city of Melbourne, the town of Geelong, and the fifty-nine boroughs of the colony of Victoria, shows that the ratepayers on the rate last made are 72,827, of whom 52,800 are rated under £25; from £25 to £50, 10,510; from £50 to £100, 5,761; from £100 to £150, 1,990; from £200 to £300, 645; at £300 and upwards, 586. The largest number of ratepayers is in Melbourne, where they number 9,442. Next to Melbourne follow the two boroughs of Ballarat West and Ballarat East with 7,067, Sandhurst with 5,033, East Collingwood with 4,445, Richmond with 3,687, Emeraldhill with 2,746, Prahran with 2,523, Fitzroy with 2,434, Hotham with 2,250, and St. Kilda with 2,007. The shires and road districts number ninety-eight, with a total number of ratepayers amounting to 52,456. The total number is distributed as follows:—Those rated under £25, 36,545; from £25 to £50, 8,981; from £50 to £100, 4,750; from £100 to £150, £1,326; from £150 to £200, 547; from £200 to £300, 437; upwards of £300, 741.

Tasmanian Hops.—"The hop-growers at New Norfolk, on the banks of the Derwent," the *Hobart Town Mercury* remarks, "will do well this year. Last year they had only 45 tons of hops; this year they calculate on 70 tons—that is, an addition of 25 tons, or an increase of rather more than one-third. Some years hops do not fetch more than 9d. per pound; this year they are worth 1s. 6d. The consumption of hops in these colonies is estimated at 1,000 tons a year, and this must be supplied either by the home-grown or the imported article. As a rule, the home-grown are preferred, chiefly on account of the aroma being better preserved. They are fresher, and do not require to be so densely packed, by which it is reasonable to suppose that some portion of their virtue is lost. There is, therefore, every encouragement for an extension of the growth of hops in this country, where the soil and climate are found to be so favourable to them."

Notes.

International Monetary Conference in Paris.—The first meeting of this Conference took place at the Ministry of Foreign Affairs, on the 18th June, under the presidency of the Minister, the Marquis de Moustier. The states represented were France, England, Austria, Baden, Bavaria, Belgium, Denmark, Spain, United States of America, Greece, Italy, Holland, Portugal, Prussia, Russia, Sweden and Norway, Switzerland, Turkey and Wurtemberg.

Gratuitous Education in France.—The municipal council of Orleans has, by the votes of 20 of its members out of 28, decreed that from the first of October next primary instruction shall be absolutely and unconditionally gratuitous in that town, the Maire and his three deputies all voting for the proposition.

MEETINGS FOR THE ENSUING WEEK.

Mon.....Entomological, 7.
Asiatic, 3.
Royal Inst., 2. General Monthly Meeting.
Tues ...Geologists' Assoc., 8.
R. Horticultural, 3. General Meeting.
Wed ...Obstetrical, 8.
Fri .....Archæological Inst., 4.
Sat .....R. Botanic, 3¾.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 19th June, 1867.

193. Bill—Poor Law Board, &c.
341. (1.) Parliamentary Boroughs and Counties—Supplementary Return.
Trades Unions and other Associations—First Report of Commissioners.

Delivered on 20th June, 1867.

124. Bill—Church Discipline Act Amendment.
197. ,, Investment of Trust Funds.
200. ,, Galway Harbour (Composition of Debt) (amended).
251. East India (Finance and Revenue Accounts)—Parts I. and II.
365. Court of Admiralty—Returns.
367. Boroughs—Return.
371. Ecclesiastical Commission (Ireland)—Annual Report.
Public Petitions—Twenty-ninth Report.

Delivered on 22nd June, 1867.

160. Bill—Writs Registration (Scotland).
360. Thames Embankment and Metropolis Improvement—Accounts.
372. Watch Cases—Return.
Trades Unions and other Associations—Second Report of Commissioners.

SESSION 1866.

116. Population, &c. (Scotland and Ireland)—Return.

Delivered on 24th June, 1867.

203. Bill—Office of Judge in the Admiralty, Divorce, and Probate Courts.
359. Court of Admiralty—Returns.
376. Edinburgh and St. Andrew's Universities—Return.
378. Galway Harbour (Composition of Debt) Bill—Special Report.
386. Naval Reserve—Return.

SECOND DELIVERY.

335. East India (Bengal and Orissa Famine)—Return.

Delivered on 25th June, 1867.

205. Bill—Edinburgh Provisional Order Confirmation.
352. Turnpike Trusts Bill—Special Report.
369. Etwall Hospital and Repton School—Return.
381. Public Works (Ireland)—Rules.
382. Labouring Classes Dwelling House Act (1866)—Bye-laws.
Treason-Felony Convicts—Report of the Commissioners.
Colonial Possessions—Reports (Part I. West Indies and Mauritius).

Patents.

From Commissioners of Patents' Journal, June 21st.

GRANTS OF PROVISIONAL PROTECTION.

Boilers—1586—J. F. N. B. Simons.
Boilers, &c.—1629—F. B. Houghton.
Buckles—1581—L. H. Dethiou and F. Beaubry.
Buildings, &c., constructing—1639—S. Harwood.
Carpets—1607—W. Wood.
Cartridges—1590—J. R. Cooper.
Chains, &c., ornamental—1622—J. Lancelott.
Chimneys—1613—F. J. Demanet.
Clocks, electrical—1641—J. Inshaw.
Compasses—1620—J. Earl of Caithness.
Crinoline skirts—1656—L. B. Schmolle.
Earrings—1601—H. Oakes.
Egg-hatching machines—1632—T. Horrex.
Engines, marine—1596—H. Turner.
Envelopes, &c., applying adhesive agents to—1623—P. Lawrence.
Fabrics—1599—W. E. Newton.
Fabrics—1608—W. E. Newton.
Fabrics—1609—W. E. Newton.
Felt carpeting—1588—T. Mitchell.
Fire-arms—1625—T. Poultney.
Fire-arms, breech-loading—1612—W. R. Lake.
Fire-arms, breech-loading—1626—T. Poultney.
Fire-arms, breech-loading—1658—I. M. Milbank.
Fire-arms, breech-loading—1664—T. Wilson.
Fire-arms, breech-loading—1670—A. Elvins.
Fire grates—1648—J. McOwen.
Fires, extinguishing—1614—J. Scott.
Fuel, drying artificial—1638—D. Barker.
Furnaces—1592—R. Newton.
Furnaces—1615—B. and W. Shakespeare.
Furnaces, &c.—1650—D. Hanson.
Galvanic batteries—1654—C. Boulay.
Galvanometers—1583—D. Tunks.
Garden engines, &c.—1640—R. W. Page.
Gold, &c., producing letters in—1589—F. J. Brean.
Haymaking machines—1618—J. Le Butt.
Iron and steel, manufacturing—1635—W. H. Richardson.
Lace machinery—1666—E. Ellis.
Lamps—1572—G. H. J. Simmons.
Lamps—1616—J. and J. Hinks.
Lamps—1668—T. Sturgeon.
Lamps, safety—1597—E. Jones.
Light, obtaining increased—1628—A. G. Schaeffer.
Lithographs, &c., taking copies of—1562—W. P. Metchin.
Liquids, measuring—1591—J. M. French.
Looms—1636—J. F. Brown.
Magneto-electric batteries—1611—M. A. F. Mennons.
Milling machines—1600—T. Greenwood.
Motive-power—1594—T. E. Passee.
Motive-power—1604—J. Francombe.
Motive-power—1624—A. M. Clark.
Mowing machines—1585—W. J. Burgess.
Music, &c., stands—1619—T. Porter.
Musical wind instruments—1587—C. Minasi.
Oakum, &c., treating—1674—E. S. Atkinson.
Paddle wheels—1644—G. Davies.
Paraffin, purifying—1646—E. Meldrum.
Peat, &c., drying—1595—W. B. Ritchie and J. G. Willans.
Pianofortes, &c.—1634—E. McLean.
Ploughs—1573—F. J. Vandenvinne.
Racks for whips, &c.—1647—J. H. Johnson.
Rafts—1649—H. W. Hart.
Signals—1672—J. Offord.
Signals, fog, &c.—1651—J. Gaudet.
Soda, hydrates and carbonates of—1655—G. White.
Spindles—1642—M. Cavanagh.
Steel, &c., casting—1606—J. Astbury.
Steel, &c., casting—1643—J. Waddington and B. Longbottom.
Veneers, producing mosaic—1598—A. V. Newton.
Vessels, raising sunken—1489—T. McComas.
Window sashes, fastenings for—1660—B. Templar.
Wool, washing and drying—1486—J. L. Norton.
Yarns—1645—T. Laidlaw.
Yarns, dyeing—1602—H. Bain.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Carriages, &c., railway—1764—W. R. Lake.
Safes, fireproof—1741—H. H. Bryant.

PATENTS SEALED.

3391. E. Allen.	3433. J. Napier.
3395. T. B. Jordan and J. Darlington.	13. A. Ward and C. G. Virgo.
3402. N. C. Franzen.	106. A. J. Cooley.
3406. A. W. Makinson.	736. J. B. Dancer.

From Commissioners of Patents' Journal, June 25th.

PATENTS SEALED.

3399. W. Brookes and J. Mayes.	3453. F. P. Warren.
3400. B. Shaw and J. Appleyard.	4. G. Stewart.
3415. J. E. Brown.	18. W. Chippindale.
3416. S. Smith & J. W. Jackson.	22. W. Knaggs.
3421. W. Simons and A. Brown.	59. J. H. Burton.
3426. W. Wilby.	619. G. Haseltine.
3427. E. B. Sampson.	644. W. E. Newton.
3437. T. W. Couldery.	659. W. R. Lake.
3438. G. Shrewsbury.	935. J. and J. Bird.
3442. A. Henry.	

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

1518. W. Whiteley & G. Harling.	1538. W. J. Pughsley.
1550. J. Bottomley.	1569. J. Holt.
1584. D. Crowe.	1576. R. Cochran.
1634. W. Brookes.	1596. H. Chamberlain, J. Craven, and H. Wedekind.
1656. S. Fox.	
1790. S. Whitehurst.	1594. B. Nicoll.
1527. A. Smith.	1599. B. F. Stevens.
1758. J. Bernays.	1684. H. E. Skinner.
1535. J. Thompson.	

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

1478. H. Nicholson.	1527. J. Ramsbottom.
1500. F. Preston.	1553. H. Cartwright.
1492. G. Hinton.	1546. W. Hooper.
1521. W. Macfarlane.	

Registered Designs.

4860—May 23—Slide for gaselier—Wootton & Powell, Birmingham.
4861—May 23—Accommodating duplex lamp glass cleaner—S. Davis and Sons, 4, John-street, Jubilee-street, Commercial-road East.
4862—May 24—A table fork—Hands and Sons, Newhall-street, Birmingham.
4863—May 29—A tambourine—F. C. Follit, Leslie-street, Mile-end-road.
4864—June 3—An indicator for central-fire guns—Pryse and Redman, Aston-street, Birmingham.
4865—June 6—The hinged advertising frame—H. Finnis, Lissongrove, W.
4866—June 6—The triune cricket bat—G. Trimmings, 25, Copenhagen-street, N.

Journal of the Society of Arts.

FRIDAY, JULY 5, 1867.

Announcements by the Council.

Meeting of Council.

Monday, July 1st, 1867.

At the first meeting of the present Council since their election, William Hawes, Esq., Vice-President of the Society, was unanimously elected Chairman for the current year.

Society's Visit to the Paris Exhibition.

The Council have directed the Secretary to make arrangements for a visit of the members of the Society to the Paris Exhibition. The period fixed for the visit extends from Monday, the 29th of July, to Monday, the 12th of August. A reception-room has been provided for the use of the members during their stay, where their correspondence may be addressed, and where they will have the convenience of writing letters, making appointments with their friends, and where notices of all arrangements for visits to various places will be suspended. Lists of hotels and apartments will also be provided there for consultation.

A programme is in the course of preparation. Members contemplating visiting Paris at this time are requested to send in their names to the Secretary, in order that cards of membership and programmes may be furnished to them.

Artizans' Visits to Paris.

At the last and former International Exhibitions held in this country, arrangements were made by the French Government to facilitate the visits of skilled artizans, and interesting reports on the Exhibitions were made by them to their government. Believing that such visits on the part of skilled workmen to these great international displays not only exercise a beneficial influence upon the men themselves, but also upon the progress of industry in the country to which they belong, the Council have resolved to raise a fund to be employed in aiding a limited number of English workmen, specially selected from their respective trades, to proceed to Paris for the purpose of studying and reporting to the Society upon the relative merits of foreign and English workmanship, as represented in the present French Exhibition.

A considerable sum will be required satisfactorily to accomplish this object, and, in order to raise these funds, the Council have determined to appeal to the members of the Society and others to join in a subscription for the furtherance of the undertaking; and they have decided to commence the subscription by a vote of one hundred guineas from the funds of the Society.

The Council have addressed a letter to Her Majesty's Commissioners for the Exhibition asking their assistance in obtaining pecuniary aid from the Government to enable them to realize their plan on a sufficiently extensive scale. Her Majesty's Commissioners thereupon passed the following resolution, which was proposed by Earl Granville, and seconded by Mr. Forster, M.P.:—"That the intention of obtaining reports by foremen and skilled workmen on their respective trades, on the occasion of their visiting the Paris Exhibition, is, in the opinion of Her Majesty's Commissioners, worthy of encouragement on the part of Her Majesty's Government."

This resolution having been transmitted by Her Majesty's Commissioners to the Lords of the Committee of Council on Education, their lordships have decided to "place at the disposal of the Society of Arts a sum not exceeding five hundred pounds, provided that the Society raises at least the same amount by voluntary subscriptions."

In order, therefore, that this grant may become available for the object in view, the Council venture to urge upon the members of the Society and others the importance of adding their names to the subscription list as early as possible.

The following is the list of subscriptions up to the present date:—

H.R.H. the Prince of Wales, President	£31	10	0
Society of Arts	105	0	0
Earl Granville, K.G.	5	0	0
Lord de L'Isle	10	0	0
Thomas Twining	2	2	0
Sir J. P. Boileau, Bart.	5	0	0
George Godwin, F.R.S.	1	1	0
Vice-Chancellor Sir W. Page Wood, F.R.S.	10	0	0
W. H. Bodkin (Assistant-Judge)	3	3	0
Sir Rowland Hill, K.C.B.	3	3	0
Benjamin Shaw	2	2	0
Alfred Davis	10	10	0
Eugène Rimmel	5	5	0
Frederick Mocatta	2	2	0
James Marshall	2	2	0
Robert Dawbarn	1	0	0
Henry Vaughan	10	10	0
Philip Sancton	5	0	0
Somerset A. Beaumont	5	0	0
G. Dixon, Mayor of Birmingham	5	5	0
Messrs. Smith and Wright, Birmingham	5	5	0
Messrs. Griffiths and Browett, Birmingham	5	5	0
Henry Weiss, Birmingham	2	2	0
W. H. M. Blews, Birmingham	2	2	0
W. Middlemore, J.P., Birmingham	5	5	0
Thomas Lloyd, Birmingham	2	2	0
Messrs. Elkington and Mason, Birmingham	5	5	0
Messrs. John Hardman and Co., Birmingham	2	2	0
Messrs. F. and C. Osler, Birmingham	5	5	0
The Proprietors of the *Birmingham Journal and Daily Post*	2	2	0
The Proprietors of the *Birmingham Gazette*	2	2	0
R. L. Chance, Birmingham	2	2	0
T. Avery, Birmingham	2	2	0
W. Tonks and Sons, Birmingham	2	2	0

W. Lucas Sargant, Birmingham	2	2	0
— Mountain (Messrs. Walter, May, and Co.), Birmingham	2	2	0
J. A. Williams, Birmingham..	2	2	0
Henry Charlton, Birmingham	2	2	0
W. Bartlett and Sons, Birmingham	5	0	0
John P. Turner, Birmingham	0	10	6
W. H. Avery, Birmingham	2	2	0
Messrs. Peyton and Peyton, Birmingham ..	3	3	0
James Cartland, Birmingham	2	2	0
Messrs. Smith and Chamberlain, Birmingham	2	2	0
Messrs. Baker and Son, Birmingham ..	2	2	0
Messrs. Hinks and Wells, Birmingham ..	2	2	0
Decimus Burton, F.R.S.	1	0	0
W. Botly	1	1	0
Professor Robert Bentley	2	2	0
John Stuart Mill, M.P.	1	1	0
G. F. Wilson, F.R.S.	2	2	0
Henry Creed	1	1	0
The Marquis of Salisbury, K.G.	10	0	0
D. Roberton Blaine	2	2	0
William Hawes	2	2	0
Seymour Teulon	1	1	0
G. N. Hooper	2	2	0
Lord Taunton	5	0	0
Henry Cole, C.B.	1	0	0

Subscriptions may be forwarded to the Financial Officer, at the Society's House.

The Council are now prepared to receive the names of any workmen recommended by their respective trades as fit and proper persons to undertake this important duty on behalf of their fellow workmen.

Subscriptions.

The Midsummer subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

Proceedings of the Society.

Food Committee.

A meeting of the Sub-Committee on Fish was held on Tuesday, 14th May:—Present, Mr. Benjamin Shaw in the chair; Mr. Caird, Mr. Ware, Mr. Michael, Professor J. Wilson, Captain Grant, and Mr. Ludford White.

Mr. Charles, of Pimlico, attended, and gave information with respect to the fish trade in London.

The Chairman, in the first place, called the attention of Mr. Charles to the alleged destruction of the fish by the salesmen in Billingsgate Market in the event of an over supply, in order to keep up the price of the article.

Mr. Charles—Had been a fishmonger many years and in a large way of business, and was well acquainted with the practice of the Billingsgate Market. He had a very large experience in the trade, and could state positively that no such thing ever occurred. He could not imagine such a thing as a salesman sacrificing a penny to benefit his neighbour a shilling. There was no union, he said, amongst the salesmen of Billingsgate for the purpose of keeping up prices, which were regulated by the supplies of each day's market. They all worked independently of each other. He gave his decided opinion that no wholesale destruction of fish, such as was alleged, ever occurred on the part either of the salesmen or the smack owners. Mr. Charles gave a brief history of the formation of the Limited Liability Company known as Hewett and Co., established for the purpose of bringing fish to the market in steam vessels in larger quantities, and with greater despatch than could generally be accomplished by the ordinary fishing vessels.

In reply to questions with respect to the establishment of another fish market in the west of London,

Mr. Charles expressed a decided opinion against such a proposition. He stated that the previous fish market which formerly existed near that spot (Hungerford) was to a great extent a failure. The establishment of another market in the west of London would, he said, have the effect of dividing the buyers, and would involve the necessity on the part of persons like himself, of having buyers at each market, and the result might be that a larger stock of a particular kind of fish might be procured than the retailer required for his trade, and that would result in loss to him.

Captain Grant explained that his own idea was the establishment of a fish market at the West-end, to which the large quantities of fish from the western coasts could be sent from the Great Western terminus, instead of the whole being conveyed as at present to Billingsgate and brought thence for distribution by the West-end dealers. It appeared to him that considerable advantage would accrue both to the trade and to the public from the establishment of a fish market in some central locality of the West-end of London.

Mr. Charles said he would give the Committee his reasons for believing that such a plan would not answer. The fishing business, he remarked, was a proverbially uncertain one. It might happen that for days and weeks together the supply of all kinds of fish was very small indeed, and it would not do to spread that over two markets. No dealer would think of going to a West-end market to buy his stock of fish. Under the existing system of the great fish market at Billingsgate there were certainly advantages both to the dealers and the public, as in the event of large quantities of fish being brought into the market it was disposed of at lower prices. The article was one of a very perishable nature, and if spoilt was a total loss to the owners. Mr. Charles did not think that the establishment of another market would lead to larger supplies being sent. He thought it would have no influence whatever upon the supplies. For instance, on that day a very large lot of mackarel was received from Kingstown, near Dublin, which were brought by steamer to Milford Haven, and thence by the Great Western Railway to Paddington; and it was no more trouble to send the vans when loaded to Billingsgate than it would be to take them to a West-end market, inasmuch as a journey from the station was involved, and it was only a matter of about three-quarters of an hour to convey the whole lot of fish to Billingsgate. He was convinced, after considerable experience, that the multiplication of fish markets in London would be found to be a disadvantage rather than an advantage, and in his opinion it was quite impracticable to work such a system. Mr. Charles would further observe that two metropolitan fish markets would be disadvantageous to each other. The sensitiveness of buyers and sellers would delay business till the state of supply in each market could be compared; in the meantime the article would deteriorate in quality and value. The price, he said, varied 50 per cent. from day to day. Soles, which one day were sold at 6d. per lb., on another day would fetch 1s. per lb. This was especially the case with regard to salmon. On the previous day he bought his salmon at 2s. per lb., that day it cost him 2s. 6d. per lb. There was a smaller supply. The variation was sometimes as great the same day. It was practically sold by auction. The salmon was consigned to salesmen, who knew their customers, and who were able to buy it and who were not. Of course it was an open market, inasmuch as those who went with their cheque-book or cash had equal opportunities of buying, but it was a bad thing for those who wanted credit.

The Chairman then called the attention of Mr. Charles to the following passage from the Report of the Fisheries Commissioners:—

"The great importance of fish as an article of food may be clearly shown by a comparison of the total supply of fish and beef to London in the course of a single year. Neither in the case of fish, nor of beef, is it possible to give accurate statistics. But it has been roughly estimated that London consumes 300,000 fat cattle annually, which, at an average weight of 6 cwt. each, would amount to 90,000 tons of beef. At this moment there are between 800 and 900 trawl vessels engaged in supplying the London market with fish, and assuming the average annual take for each to be 90 tons, this would give a total of some 80,000 tons of trawled fish. This is irrespective of the vast quantities of herrings, sprats, shell-fish, and of other descriptions of fish which are supplied by other modes of fishing. The weight of beef and of fish annually consumed in London is thus in no great disproportion. But the price is very different. The fisherman receives, on an average, little over £7 a ton for his fish, prime and offal together,—the farmer is readily paid for his beef not less than £60 a ton. But this disparity of price becomes the more remarkable when tested by the practical experience, not of the producer but of the consumer. The buyer of fish in the West-end of London finds that, on the average, his fish costs him more per pound weight than his beef or mutton. And when inquiry is made, the salesmen at Billingsgate readily admit that the retail dealer gets an enormous profit on the small quantity of fish he disposes of. It might be thought that the competition of trade would rectify any demand for excessive profit, but in this case it does not seem to have that effect. While the fishermen receive 3d. to 4d. a pound at Billingsgate for prime fish, the buyer is charged 1s., 1s. 3d., and 1s. 6d. a pound by the retailer."

Mr. Charles said he had read that report, and since receiving the invitation to attend before the committee, he had taken care to weigh several varieties of fish for their information. He would explain, first, with regard to trawl fish, that was brought to market now, whereas formerly it was not considered worth bringing. This remark especially applied to haddocks, from the great demand which existed for that article in a cured state. Formerly the great supply of that article was sent from Scotland, but the demand was so great that very large quantities were cured in London. Haddocks caught by the trawl used to be regarded as offal, and were the perquisites of the fishermen, who dried what they required in the rigging. The haddocks used for table were only those caught by the hook, though the fish were not so good as those which were trawled. The cause of the great difference of price wholesale to the fishowners and that charged by the salesmen to their customers was from a large proportion of the fish being of an inferior quality, which was sold at a low price by the retailer, whilst the large proportion of fish required by such dealers as himself was of high quality. The low-priced fish reduced the average.

[Mr. Charles read from, and handed in to the committee, invoices of fish, showing the great variation in the price of salmon from day to day, as also of turbots, soles, &c. The difference in the price of salmon wholesale was shown to be as much as 8d. per lb., from one day to another.]

Mr. Caird remarked that the greatest fluctuations appeared to exist in salmon, which was not a sea-fish.

Mr. Charles said, even in sea-fish the fluctuations in price were very considerable. On that morning he was able to buy whitings at half the price he paid for them on the previous day. He bought them of a master fisherman, who sold his own goods, at 7d. per lb., which was equal to £65 8s. 8d. per ton, while salmon, at 2s. 1d. per lb. was equal to £233 6s. 8d. per ton; turbot at 6d. per lb. was equal to £56 per ton.

Mr. Caird remarked that it was very much the subject of complaint that the difference between the price charged to the customer and that paid to the salesman by the West-end dealers was very much greater than fair profits of trade required or justified.

Mr. Charles said the fact was not so. It was to be borne in mind that the fish was weighed to the dealer as it came into the market, including the offal, which, in some kinds of fish, amounted to a large proportion. The fish sold by retailers to their customers was sold free from all offal whatever, and in a clean state. In the preparation of whitings for table they lost nearly half their original weight. A fish which weighed one pound, when it was skinned and cleaned ready for table would not weigh much more, perhaps, than half a pound. It was, therefore, scarcely a fair way of putting it. As far as his own experience went, looking at the many expenses which the trade entailed, the profits of the retailers were by no means excessive, nor were they equal to those of many other trades in which the article dealt in was not of a perishable nature. He estimated that the profits upon all that passed through the hands of a dealer like himself would not be more than 10 per cent., which, looking to the expenses, could not be regarded as excessive. Personally speaking, he was satisfied with that amount of profit in his business.

The Chairman remarked that as compared with meat there was this difference, that nearly all the offal of an animal was turned into money by the retailer, which could not be the case with fish. Reverting to the question of a West-end fish market, he observed that at the present day Billingsgate could not be regarded as a central market for the metropolis.

Mr. Charles remarked he thought it was the best centre for the trade that could be found. Even London itself, he said, was not so central as it used to be for a fish market. Large quantities of fish were now sent direct from Hull to Ireland which used formerly to be sent to London.

Captain Grant inquired whether the space for fishing vessels was not very restricted at Billingsgate?

Mr. Charles replied that there was generally plenty of room for the vessels. Such large quantities of fish were now sent by railway that there were not one-fourth of the vessels at Billingsgate which there used to be.

Mr. Ware called the attention of Mr. Charles to the following passage in the report of the Fisheries Commissioners:—

"The wholesale price realized for the two descriptions of fish by the fishermen is shown in the returns for five years, given by Mr. Knott. His average price per ton was about £7; but the price of the "prime" averaged £23, while that of the offal was only £2. It may indeed be said, broadly, that the main supply of the cheaper description of fish, which forms so valuable an article of food to the large masses of our population, is yielded by modes of fishing other than line-fishing, and that any attempt to restrict the industry of fishermen to that mode of capture would be certainly followed by an immediate diminution in quantity and increase in price of the coarser kinds of fish, and by a nearly total cessation of the supply of soles."

Mr. Charles observed that of the fish taken by the trawl, not a sixteenth could be estimated as prime fish. Large turbots were not now put upon the table; smaller sized fish were preferred, and while a turbot weighing 20lbs. or 24lbs. might be bought for 12s., as much as 8s. would be given for a fish of less than half that weight. With regard to the price of 2½d. per pound, or £23 per ton, for "prime," he could inform the committee that he had this year paid as much as 30s. each for cod fish; he was obliged to pay that price or go without; but he must have fish for his customers, whatever the price might be; and he might state that for every prime fish that came into the market there were ten buyers. The supply at present was generally nearly equal to the

demand, but there always had been ten buyers for every fish.

Professor Wilson suggested that that fact implied that the supply was not equal to the demand.

Mr. Charles said sometimes things were cheap; but there must be times when things were scarce, and then the prices went up. If the supply were doubled and trebled the consumption would take it up no doubt. He thought no limit could be placed upon it. If they could bring fish to £7 per ton there would be no limit to the demand for it.

Mr. Ludford White remarked that it had been stated to the committee that fish was sometimes kept back at the port in order to keep up the prices.

Mr. Charles believed, if it was done at all, it was only to a limited extent. It might be the case that a very good cargo of fish might be divided over two markets—a portion being sent to-day and the remainder to-morrow; but that was not done to any great extent.

Mr. Caird asked whether Mr. Charles considered the supply at Billingsgate was increased or otherwise.

Mr. Charles replied it had diminished in his time; because London was not so central as it used to be, and the fish which used to be sent from Hull and Grimsby did not now come to London.

Mr. Caird further asked whether Mr. Charles was aware of any large increase in the investment of capital in the fishing trade in consequence of the increased demand of the London market?

Mr. Charles said no doubt there had been a large increase of capital employed in the trade, and the vessels engaged in it were worth a very considerable sum.

Proceedings of Institutions.

East Lancashire Union of Institutions.—The annual summer examination of this Union was held on Saturday, June 15, and attended by 129 candidates, of whom seventeen were females. The candidates met at nine o'clock, a.m., in the Assembly-room of the Mechanics' Institution, Burnley, and, with two hours' interval in the middle of the day, the examination lasted till five p.m. Arrangements were made by which those candidates who came from a distance were enabled to travel to and from Burnley for one fare. The pupils of the following Institutions competed:—Burnley Mechanics' Institution, Burnley Church Literary Institution, Bacup, Haslingden, Crawshawbooth, Rawtenstall, Newchurch, and Lomeshaye. There are now two distinct annual examinations of the Union—a previous examination having been held at the end of March, for the last two years, for the convenience of those evening classes where the pupils disperse early in the spring. This examination is held at local centres, while the summer examination is held collectively at Burnley. The spring examination was attended by 100 candidates, of whom eighteen were females. The examinations have therefore been attended this year by 229 candidates, 194 males and 35 females, a larger number than in any previous year. After the examination on June 15th, Sir James Kay-Shuttleworth, Bart., the President of the Union, delivered an eloquent address to the candidates on the state of education in France and Prussia in comparison with that of England, and pointed out the urgent necessity for more attention to the secondary and technical education of the industrial population, if England is to keep pace with the Continental nations in inventive skill and manufacturing industry.

PARIS UNIVERSAL EXHIBITION.

The following are the particulars of prizes awarded to British exhibitors:—

In the fine arts department three prizes—Mr. Calderon, A.R.A., taking a first, and Mr. E. Nicol and Mr. F. Walker each a second prize. In Class 3 Messrs. A. B. Wyon and J. S. Wyon obtained third class prizes; and in Class 4 a first prize was awarded to the late Captain Fowke, a second to Mr. W. D. Lyne, and a third to Mr. E. Barry.

In Class 5 (Engraving and Lithography) no prize was awarded to Great Britain.

Of the grand prizes six were awarded to British exhibitors. The following are the names of the holders of these prizes—Group I. (Class 4, Architectural Designs and Models), Mr. Waterhouse; in Group VI. (Class 54, Machine Tools), Mr. Whitworth; Class 64 (Telegraphic Apparatus), the Atlantic Telegraph Company, and Siemens Brothers, London; and in Class 66 (Navigation), the Lifeboat Society, Napier and Sons, Glasgow, and Penn and Co., Greenwich.

The following is a list of the awards to other British exhibitors:—

Group II.—Apparatus and Application of the Liberal Arts.

Class 6.—*Printing and Books.*—Gold Medal—V. Brooks. Silver Medal—Bradbury and Evans, Cassell, Petter, and Galpin, Chambers, Hanhart, Illustrated London News, W. Mackenzie, Rowney, Spottiswoode and Co., Blake, Stephenson, Virtue and Co. Bronze Medal—Wilkinson Bradbury, Butler and Tanner, Day and Sons, Dickes, Macdonald Maclure, Nelson and Sons, Wallis. Honourable Mention—Belous (Gloucester).

Class 7.—*Paper, Stationery, Binding, Painting, and Drawing Materials.*—Gold Medal—Cowan and Co., Saunders. Silver Medal—Brockedon, Crompton, Gillot and Co., Goodall, Hyde (ink), Hyde (wax), Letts and Son, Mordan, Portal (Laverstoke Mills), Riviere, Rowney, Stephens, Marcus Ward, Waterston. Bronze Medal—Alexandra Printing Ink Company, Bain, Beauley, Beldridge, Bell and Daldy, Blackie, Brokedon, Brown, Causton, Cohen, Day and Son, Eyre and Spottiswoode, Wells Hinks, Hughes and Kimber, Zaehnsdorf, Lamb, Lyon, Morley, Newman, Ramage, Reeves, Reynolds, Sampson Low, Smith and Elder, Team's Wood Pulp Company, Willey, Wills, Wolff.

Class 8.—*Applications of Drawing and Modelling to the Common Arts.*—Silver Medal—Lord Romilly, Society of Arts, J. S. and A. B. Wyon. Bronze Medal—Aldridge (Kensington Museum), Marcus Ward, Thomas Martin, Newman, Ortner and Houle, Rooke, Ball Seeram, Sparkes. Honourable Mention—Jenner and Newstub, Master of the Rolls, A. Slatter (South Kensington Museum).

Class 9.—*Photograph Proofs and Apparatus.*—Silver Medal—Bedford, Dallmeyer, England, Mudd, Robinson, Swann, C. T. Thompson, Woodbury. Bronze Medal—Blanchard, Briggs, Caldese, N. K. Cherrill, Griggs, Joubert, Macfarlane, Mayall, Meagher, Ross, Tod, Vernon Heath, Wortley. Honourable Mention—Beasley, Beau, Browning, Cameron, Coghill, Cramb, Cridal, Cruttenden, Hemphill, Hosmer, Pantascopic Society, Pouncey, Ross, Rouch, Royal Artillery, Solomon, Swann, Thomas, Thompson, Verschoyle, Wilson, Wordley.

Class 10.—*Musical Instruments.*—Gold Medal—Broadwood. Silver Medal—Bevington, Distin, Kirkman. Bronze Medal—Alison, Brinsmead, Bryceson, Ramsden, Wornum. Honourable Mention—Kelly, Lachenal.

Class 11.—*Medical and Surgical Instruments and Apparatus.*—Gold Medal—Ash and Sons. Silver Medal—Evans and Stevens, Masters, Savory and Moore. Bronze Medal—Lemale, Longdon, Rein, Roth. Honourable Mention—Bacon, Earl of Caithness, Condy, Dickson, Marsden, Normans and Sons, Redford, T. P. Salt, Spence, Twinberrow, Wright.

Class 12.—*Mathematical Instruments and Apparatus for Teaching Science.*—Gold Medal—Beck, Chance, Dallmeyer, Ross. Silver Medal—Elliott, Ladd. Bronze Medal—Cole, Maru, Pauchett, Statham. Honourable Mention—Bethune, Crisp, Cronmire, Dunlop, Smith.

Class 13.—*Maps and Geographical and Cosmographical*

Apparatus.—Silver Medal—Selwyn, Stamford. Honourable Mention—Bousquet, T. Nelson and Sons.

GROUP III.—FURNITURE AND OTHER OBJECTS FOR THE USE OF DWELLINGS.

CLASSES 14 AND 15.—*Furniture and Upholstery and Decorative Work.*—Gold Medal—Owen Jones, Wright and Mansfield. Silver Medal—Dyer and Watts, Gillow, Holland, Trollope. Bronze Medal—Bettridge, Clayton and Bell, Cole, Colman, Heal, Hunter, Ingledew, Jackson (Rathbone-place), Lamb, Macdonald, Peyton, Rowley, Taylor, Wedgewood, Wertheimer, Wyatt. Honourable Mention—Alderman, Benham, Lady Carrington, Cox, Filmer, Hayward, Skidmore, Ward.

CLASS 16.—*Flint and other Glass; Stained Glass.*—Silver Medal—Dobson, Hardman, Powell. Bronze Medal—Aire and Calder, Edmundson, J. Green, Heaton, Pellatt, Ward and Hughes. Honourable Mention—Cottier, Cox and Son, Dury, Gardner, H. Green, Lavers and Barraud, Millar, Newman, Phillips, Bond-street.

CLASS 17.—*Porcelain, Earthenware, and other Fancy Pottery.*—Gold Medal—Copeland, Minton. Silver Medal—Brownfield, Doulton, Wedgwood. Bronze Medal—Gray, Jones, Pinder, Price, Primavesi. Honourable Mention—Adams, Allen, Bishop's Waltham Clay Company.

CLASS 18.—*Carpets, Tapestry, and Furniture Stuffs.*—Gold Medal—Brinton and Lewis, Templeton. Silver Medal—Ackroyd, Henderson, Lapworth, Leather Cloth Company, Morton, Nairn, Patent Woollen Cloth, Wilkinson, Willis. Bronze Medal—Britannia Rubber Company, Deed, Firth, Humphries, Kohnstamm, Southwell, Harry Tayler, Templeton, Treloar, Woodward and Grosvenor, Woodward, Palmer. Honourable Mention—Cow, Hill, Hoff, Trestrail, Tull, Whincup, Whiteley, Wildey.

CLASS 19.—*Paperhangings.*—Gold Medal—Potter. Silver Medal—Scott, Cuthbertson. Bronze Medal—W. Cooke, Jeffrey, Marsden, H. Woollams, J. Woollams. Honourable Mention—Horne.

CLASS 20.—*Cutlery.*—Gold Medal—Brookes and Crookes. Silver Medal—Morton. Bronze Medal—Mappin, Webb, M'Daniel.

CLASS 21.—*Gold and Silver Plate.*—Gold Medal—Elkington, Hancock, Hunt and Roskell. Silver Medal—H. Emanuel. Bronze Medal—Mappin, Webb, Watherston, Shaw and Fisher. Honourable Mention—Donne, Hardman.

CLASS 22.—*Bronze and other Artistic Castings and Repoussé Work.*—Nil.

CLASS 23.—*Clock and Watch Work.*—Gold Medal—Kulberg, Parkinson and Frodsham, Poole. Silver Medal—Adams, Blackie, G. Blackie, Dent, Mercer, Nicole and Capt. Bronze Medal—Benson, Claxton, Holdsworth, Johannsen, Sewell, O. Vivier, Walker, White. Honourable Mention—Howell and James, Webster.

CLASS 24.—*Apparatus and Processes for Heating and Lighting.*—Gold Medal—Winfield. Silver Medal—Benham, Bowser. Bronze Medal—Adams, Brown and Green, Leoni, Philp, Solomon, Musgrave, Woodcock. Honourable Mention—Barton, Best and Hobson, Defries, Forrest, Freeman, Glover (Pimlico), Huxhams and Brown, Leamington Range Company, M'Sherry, Ratcliff, Steel and Garland, Strode, Sullivan, Young Brothers.

CLASS 25.—*Perfumery.*—Silver Medal—Atkinson. Bronze Medal—Cleaver, Pears, Perks, Piesse, Rimmell. Honourable Mention—Napoleon Price, Ransom, Remington.

CLASS 26.—*Morocco Work, Fancy Articles, and Basket Work.*—Silver Medal—Leuchars, Schaffer. Bronze Medal—Betjemann, Goggin, Jenner, Marcus Ward. Honourable Mention—Fenton, Howell and James.

GROUP IV.—CLOTHING, INCLUDING FABRICS, AND OTHER OBJECTS WORN ON THE PERSON.

CLASS 27.—*Cotton Yarns, Threads, and Tissues.*—Gold Medal—Armitage, Bazley, England and Scotland (collection), Horrockses, Radcliff. Silver Medal—Barlow and Jones, Crewson, Hawkins, Kesselmeyer, Langworthy, Tolson. Bronze Medal—Christy, Faulkner, Glover (Manchester), Hall and Udall, Jabez Johnson. Honourable Mention—Martin and Johnson.

CLASS 28.—*Flaxen and Hempen Yarns, Threads, and Tissues.*—Gold Medal—"Belfast," Brown, Charley, Fenton. Silver Medal—Matier. Bronze Medal—Glasgow Jute Company. Honourable Mention—Ainsworth, Pegler.

CLASS 29.—*Combed Wool and Worsted Yarns and Fabrics.*—Gold Medal—Ackroyd, "Bradford." Silver Medal—Middleton, Mitchell and Shepherd, Willett. Bronze Medal—Smithson, Taylor.

CLASS 30.—*Carded Wool and Woollen Yarns and Fabrics.*—Gold Medal—"South of Scotland," "West of England." Silver Medal—Batley Chamber of Commerce, Bliss, J. and H. Brown, Clay, Davies and Sons, Geissler, Houston, Jowling, Laverton, Lawton, Marling and Co., Leonard Marling, Naish, Salter, Strachan, Taylor Brothers. Bronze Medal—Barnicott, Binns and Godfrey, Birchall, Byers, Carr, Colson and Co., Howgate Day, Watkinson Day, Nicholls Dixon, Firth, Hall and Frater, Haigh, Hargreave, Harrison, Hunt and Winterbotham, Laing and Irvine, Mahoney, Mellor, Riley, Sanderson, Scott and Sons (Morley), Smith and Sons (Morley), Stockdale, Taylor and Lodge, Thackral, Thomson and Dodd, Vickerman, J. Walker and Sons, Wilson (Kendal). Honourable Mention—Cambrian Flannel, Crowther and Sons, Glendinning, Hogg M'Intyre, Kershaw (Rochdale), Leathly, Scholefield, R. Scott, W. Scott, J. Scott and Sons, Stockwell, Wade, Walton and Rhodes.

CLASS 31.—*Silk and Silk Manufactures.*—Gold Medal—Collective British. Silver Medal—Birchenough, Nicholson Brough, Carter and Phillips, Cortauld, Franklin, Fry and Co., Grout, Seamer, Slater, (Buckingham), Spires, Taylor and Stokes. Bronze Medal—Carr and Co., Chadwick, Coventry Elastic, D. Evans, Hart, Hodges (Leicester), Lister, Norwich Crape, Posselt, Wanklyn. Honourable Mention—Grant and Gask, Hall and Udall, George Holme, Kay and Richardson, Kesselmeyer, Greenhalgh, Peel, Turner, Barrs and Co.

CLASS 32.—*Shawls.*—Silver Medal—Scott Kerr. Bronze Medal—Bliss, Brigg. Honourable Mention—Hitchcock Williams, Johnstone, Manby, Romanes and Paterson, Smith.

CLASS 33.—*Lace, Net, Embroidery, and Trimmings.*—Gold Medal—"Nottingham." Silver Medal—Copestake, Hartshorn, Hayman and Alexander, Jacoby. Bronze Medal—Allen (Dublin), Barnet and Maltby, Dunnicliffe, Mary Jones, Lester, Manlove Packer, Tredwin. Honourable Mention—Mrs. Alderson, Davies and Co. (St. Martin's-lane), Miss Maclean.

CLASS 34.—*Hosiery, Under-Clothing, and Minor Articles.*—Gold Medal—Hogg M'Intyre. Silver Medal—Plant (Leicester), Smyth (Dublin). Bronze Medal—Coles, Martin, Pentony, Swears and Wells, Sweetman. Honourable Mention—De Becker, Jowett, Lane.

CLASS 35.—*Clothing for both Sexes.*—Silver Medal—Christy, Lobb, Player, Vyse. Bronze Medal—Atloff and Norman, Carles, Craig, East, Glew, Hall, Melton, Brown Munt, Tait, Tress, Welch, Wilhelm. Honourable Mention—Ashton, Bowley, Grant, Hall (Hats), Hall (Sparkes), Mole, Norman, Wilson (Newcastle).

CLASS 36.—*Jewellery and Ornaments.*—Gold Medal—Phillips. Silver Medal—Brogden, Emanuel, Hancock, Hunt and Roskell, Randel (Birmingham). Bronze Medal—Crouch, Howell and James, Jacob, Lund, Marshall, Watherston. Honourable Mention—Neal, Thomas, Turnbull, Wheatley, Wiley.

CLASS 37.—*Portable Arms.*—Silver Medal—Greener, Lang, Reilly, Small-Arms Company, Whitworth. Bronze Medal—Gibbs, A. L. Gibbs. Honourable Mention—Dougall, Ludlow, Prentice.

CLASS 38.—*Travelling and Camp Equipages.*—Silver

Medal—Cave, Wilkes. Bronze Medal—Silver. Honourable Mention—Bussey Smith.

Class 39.—*Toys.*—Silver Medal—Cremer.

Group V.—Products, Raw and Manufactured, of Mining Industry, Forestry, &c.

Class 40.—*Mining and Metallurgy.*—Gold Medal—Barrow (Alverston), Bowling Iron Co., Brown (Sheffield), Burys (Sheffield), Johnson, Matthey and Co., Lilleshall, Low Moor, Monkbridge Co., Turton. Silver Medal—Bartleet, Beard and Sons, Boulton, Comfort, Dowlais, Eagle Iron Co., Evans and Askin, Everett, French Jewellery Co., Gilpin, Hart and Sons, Johnson and Nephew, Kirby, Beard, Lloyd and Lloyd, Loveridge, Patent Bolt and Nut, Plumbago, James Russell, John Russell, Sharp, Brown, Taylor Brothers, Tonks, West Cumberland, Whitley. Bronze Medal—Aberdare, Addis, Baugh, Betts, Birmingham Iron and Brass Tube Company, Blaenavon, Bodringalt, Broughton Company, Bwllfa, T. Clark and Co., Elliott's Company, Davis (Cardiff), English and Australian Copper Company, Green's Tube Company, Greening, Haswell Coal Company, Heeley, Hill (Birmingham), Dr. Honeyman, Field, Macdonald, Martineau and Smith, Moreton (Wolverhampton), Millward (Redditch), Morewood and Rogers, Page, Reckitt, T. Smith and Co., Stickley, Walker and Parker, Webster and Horsfall, Wigan Company, Zobel, Townsend and Co. Honourable Mention—Abbott, Bankart, Barnes, Benham, Braby, Brotherton, Dollar Brothers, Green, Gregory, Hayes and Bennett, Heath, J. V. Hill, James Foundry, Leach, Martin, Millward (Birmingham), North of England Forged Nail and Rivet Company, Perrens and Harrison, Pratt, Smith (Leicester), Sparkes, Stanley, Taliska Mining Company, Tudor, Earl Vane, Vickerman, Walton, Whiteway, Ystafera.

Class 41.—*Forest Products and Industries.*—Bronze Medal—South Kensington.

Class 42.—*Products of the Chase and Fisheries; Uncultivated Products.*—Silver Medal—Bevington, Deed and Ward. Honourable Mention—Da Costa.

Class 43.—*Agricultural Products (not used as Food) easily Preserved.*—Silver Medal—St. Ann's Model Farm, Neighbour. Bronze Medal—Bickersteth, Collier, Davis, Evans and Stafford, Kirtseklin, Morton, Raynbird, Thompson, Windle, Woollerton.

Class 44.—*Chemical and Pharmaceutical Products.*—Gold Medal—Allhusen, Gossage, Howard, Jarrow Company Muspratt, Price's Company, Young's Paraffin. Silver Medal—Bailey, Bewicke, British Seaweed, Calvert, H. B. Condy, Cow, Hill, Denton and Jutsum, Demuth, Field, Gaskill, D. and W. Gibbs, Hopkin and Williams, Hurlet Alum Company, Johnson and Matthey, Knight, Macfarlane, Mander Brothers, Mawson, Ogleby, Parkes, Rose, Smith, Tudor, Walker Alkali Company, Warne, Wilkinson. Bronze Medal—Adams, Baker and May (Class 30), Britannia Rubber, Burgoyne, Bush, Calley, Clarke, W. Cook and Co., Danley, Davy, Yates and Routledge, Day and Martin, Dodge, Garrod, Goodwin, Green, Haas and Co., Hodgson and Simpson, Holland, Hosegood, Huskisson, C. Jarrow, Langton and Bicknells, Lamb and Sterry, Lange and Moselle, Lowe (Manchester), M'Dougall, M'Kay, Mason, Nimmo, J. N. Parker and Co., Pulford, W. Ransome, Rogers, Rumsey, Squire, Stephens, Talbot and Alder, W. Taylor and &c., Turner and Son, Wandle, Waring.

Class 45.—*Specimens of the Chemical Processes used in Bleaching, Dyeing, Printing, and Dressing.*—Silver Medal—Hands, Ripley. Bronze Medal—Barlow, Dickens, Howe. Honourable Mention—Whincup.

Class 46.—Leather and Skins.—Silver Medal—Dixon, Evans, Flitch, Puckridge, Wilson, Walker, Winter and Masters. Bronze Medal—Deed, Pullman. Honourable Mention—Bayley, Brearly, Webb.

Group VI.—Apparatus and Processes used in the Common Arts.

Class 47.—*Apparatus and Processes of Mining and Metallurgy.*—Silver Medal—Carrett, Marshall, Jones and Levick. Bronze Medal—Bickford, Smith, Towler. Honourable Mention—Beaumont and Locock.

Class 48.—*Implements and Processes used in the Cultivation of Fields and Forests.*—Gold Medal—Clayton, Fowler, Garrett, Hornsby, Howard, Ransomes. Silver Medal—Aveling, Benthall, Coleman, Marshall, Penny, Pixley, Reading Company, Richmond, Robey, Samuelson, Smith (Peasenhall), Turner. Bronze Medal—Ashby, Bamlett, Kearsley, Nicholson, Ruston, Smith (Kettering), Wallis, Woods. Honourable Mention—Amies, Ball, Brown and May, Fox, Walker, Parkes, Palmer, Underhill.

Class 49.—*Implements used in the Chase, Fisheries, and Gathering Wild Products.*—Silver Medal—Aldred, Beard, Kirby, Irish Fisheries. Bronze Medal—Bartleet, Milward. Honourable Mention—Buchanan, Ryder.

Class 50.—*Apparatus and Processes used in Agricultural Works, and for the Preparation of Food.*—Silver Medal—Atmospheric Churn, Bradford, Clayton, Spencer. Bronze Medal—Collier, Fleet, Kent, Loftus Perkins, Lyon, Pontifex, Robinson, Silicated Filter, Tye, Whitehead. Honourable Mention—Barnett, Bawden, Canadian Company, Carson and Toone, Clark and Dunham, Farrow and Jackson, Hickling, Keith, Summerscales, Wenham Lake, Williamson.

Class 51.—*Apparatus used in Chemistry, Pharmacy, and Tanning.*—Gold Medal—Johnson, Matthey and Co. Silver Medal—Cocks, Plumbago Company. Bronze Medal—Doulton, Hynam, Porter. Honourable Mention—Baker, Bower, Carr, Cliff, Huxhams and Brown, Kent, Wilson.

Class 52.—*Prime Movers, Boilers, and Engines, specially adapted to the Requirements of the Exhibition.*—Silver Medal—B. Donkin, Fox, Walker, Galloway, Hicks, Hargreaves, Porter. Bronze Medal—Appleby, Sharp, Stewart.

Class 53.—*Machines and Apparatus in General.*—Gold Medal—Merryweather. Silver Medal—Carrett, Marshall, Donkin, Eades, Glover and Co., S. Glover, Gwynne, C. Lloyd, Pooley and Sons, Reading Company, Shand and Mason, Tangye, Weston. Bronze Medal—Baines, N. Defries, Electro-Magnetic Company, Gas Meter Company, E. Green and Son, Kennedy, Marshall, Sons, and Co., Paul, Royal Life Protection Society, Sugg, West and Gregson, Williamson, North Moor Foundry Company. Honourable Mention—Bastier, Bernays, Denison, Dewrance, Duckham, J. C. Hill and Co., T. Lambert and Sons, Leoni, Newton and Braddock, Swann, R. W. Thomson, Warne, Westminster and London Meter Company.

Class 54.—*Machine Tools.*—Gold Medal—Hill Shepherd, Stewart, Sharp. Silver Medal—D. Davies, De Bergen, Tannett, Walker, Thwaites and Carbutt, Worsam. Bronze Medal—Bass, Clayton, Massey, Neilson, Charles Powis, Powis and James, Robinson (Rochdale), Whitehead (Preston). Honourable Mention—Easterbrook, Sketchley, Rhodes.

Class 55.—*Apparatus and Processes used in Spinning and Rope Making.*—Gold Medal—Lawson, Platt. Silver Medal—Brook, Combe, Horsfall, J. and S. Smith, Wren. Bronze Medal—Booth, Dixon, Irvine, Leoni, Watkins. Honourable Mention—Hodgkin, Mallinson.

Class 56.—*Apparatus and Processes used in Weaving.*—Gold Medal—Howard and Bullough, Leeming, George Hodgson. Silver Medal—Hall (Bury), Hattersley, Keighly, Parker, W. Smith and Brothers. Bronze Medal—Cooke and Hacking, Ferrabee, Sowden and Stephenson, Lindsay Urquhart. Honourable Mention—Ingham, Salter.

Class 57.—*Apparatus and Processes for Sewing and for Making up Clothing.*—Silver Medal—Thomas, Wanzer. Bronze Medal—Newton Wilson, Simpson, Turner. Honourable Mention—Alexandra, Clements, Pitt.

Class 58.—*Apparatus and Processes used in the Manufacture of Furniture and other Objects for Dwellings.*—Nil.

Class 59.—*Apparatus and Processes used in Paper-making, Dyeing, and Printing.*—Silver Medal—Boildeau. Bronze Medal—Robinson. Honourable Mention—Stones.

Class 60.—*Machines, Instruments and Processes used in various Works.*—Nil.

Class 61.—*Carriages and Wheelwrights' Work.*—Gold Medal—Peters. Silver Medal—Aldebert, Cockshoot, Cole, Holmes, Lawrie, Mason, E. and G. Morgan, Rock, Ward, Woodall, Wyburn. Bronze Medal—Evans, Fuller, Hutton, Ivall, M'Naught and Smith, F. Mulliner, H. Mulliner, Offord, Starey, Thorn, Windover. Honourable Mention—Cooper, Davies.

Class 62.—*Harness and Saddlery.*—Silver Medal—Haynes, Swayne. Bronze Medal—Bliss, Hampson, Martin, Shammon. Honourable Mention — Aldred, Blackwell, Cuff, Ellam, Head, Jassman, M'Cracken.

Class 63.—*Railway Apparatus.*—Gold Medal—Kitson, Saxby and Farmer, R. Stephenson. Silver Medal—Lilleshall, Pooley (Liverpool), Turton. Bronze Medal—Alice Gordon, Livesay, Preece, Spencer (Newcastle). Honourable Mention—Dering, Fairlie, Hughes, Ruston, Proctor.

Class 64.—*Telegraphic Apparatus and Processes.*—Gold Medal—Henley, Hooper. Honourable Mention—Nicoll.

Class 65.—*Civil Engineering, Public Works, and Architecture.*—Gold Medal—Chance Brothers, Minton. Silver Medal—Blanchard, Blashfield, Chubb, C. B. Cole, J. Cliff and Son, Doulton, Hobbs, Jennings, Maw and Co., Peake, Pulham, White Brothers. Bronze Medal—Brooke, Chatwood, Clark's Blinds, Colthurst, Eassie, Gallichan, Gotto, Greaves, Macdonald, Norman, F. Ransome, A. Robinson, Sissons and White, Welch Slate Company. Honourable Mention — Cooke, Sandham, Lord Willoughby.

Class 66.—*Navigation and Lifeboats, Yachts, and Pleasure Boats.*—Gold Medal—Clarke (Great George-street), Humphries and Tennant, Laird Maudsley, Randolph, Samuda, Thames Iron Works. Silver Medal—Colomb, Denny, Gisborne, Halstead, Martin, C. Mitchell, Palmer's Company, Ravenhill, Rennie, J. S. White. Bronze Medal—Bolton, Clifford, Gourlay, Harfield, I. Harvey and Co., Hurst, Huxhams and Brown, Inglis, Lloyd's Register, Matthew, Oswald, Richardson, Duck, J. Taylor and Sons, Ward. Honourable Mention—Daft, Hay, Lumley, Ritchie, Tucker, Walker, W. H. Walker, Wishart.

Group VII.—Food, Fresh or Preserved, in various States of Preservation.

Class 67.—*Cereals, and other Eatable Farinaceous Products, with their Derivatives.*—Silver Medal—Berger, Orlando Jones, Raynbird, Reckitt. Bronze Medal—Steward (Bristol), Pile (Whitby).

Class 68.—*Bread and Pastry.*—Silver Medal—Huntley, Peek, Frean.

Class 69.—*Fatty Substances used as Food—Milk and Eggs.*—Nil.

Class 70.—*Meat and Fish.*—Silver Medal—Morton.

Class 71.—*Vegetables and Fruit.*—Silver Medal—Crosse and Blackwell. Bronze Medal—Batty, Burgess.

Class 72.—*Condiments and Stimulants; Sugar and Confectionery.*—Silver Medal—Colman, Fry, Salt (Chamber of Commerce). Bronze Medal.—Batty, Crosse, Keen. Honourable Mention—Burgess, Gatti.

Class 73.—*Fermented Drinks.*—Gold Medal—Allsopp, Bass. Silver Medal—Aitcheson, Ballingall, Burton Brewery.

Group VIII.—Live Stock and Specimens of Agricultural Buildings.

Class 74.—*Farm Buildings and Agricultural Works.*—Nil.

Class 75.—*Horses, Asses, Mules.*—Nil.

Class 76.—*Bulls, Buffaloes, &c.*—Nil.

Class 77.—*Sheep, Goats.*—Nil.

Class 78.—*Pigs, Rabbits.*—Nil.

Class 79.—*Poultry.*—Nil.

Class 80.—*Sporting Dogs and Watch Dogs.*—Nil.

Class 81.—*Useful Insects.*—Nil.

Class 82.—*Fish, Crustacea, and Mollusca.*—Nil.

Group IX.—Live Produce and Specimens of Horticultural Works.

Class 83.—*Glass Houses and Apparatus.*—Nil.

Class 84.—*Flowers and Ornamental Plants.*—Nil.

Class 85.—*Vegetables.*—Nil.

Class 86.—*Fruit Trees.*—Nil.

Class 87.—*Seeds and Saplings of Forest Trees.*—Nil.

Class 88.—*Hot House Plants.*—Nil.

Group X.—Articles Exhibited with the Special Object of Improving the Physical and Moral Condition of the People.

Class 89.—*Apparatus and Methods used in the Instruction of Children.*—Silver Medal—Christian Knowledge Society, Home and Colonial, John Hullah, Sunday School Union. Bronze Medal — Oliver and Boyd, Williams, Windsor. Honourable Mention—W. Stevens.

Class 90.—*Libraries and Apparatus used in the Instruction of Adults, at Home, in the Workshop, or in Schools and Colleges.*—Gold Medal — Book Hawking Union, South Kensington. Honourable Mention—Cronmire, Wright.

Class 91.—*Furniture, Clothing, and Food from all sources, remarkable for useful qualities combined with cheapness.*—Honourable Mention—Harry Tayler.

Class 92.—*Specimens of the Clothing worn by the people of different Countries.*—Nil.

Class 93.—*Examples of Dwellings characterised by cheapness, combined with the condition necessary for health and comfort.*—Bronze Medal—Lord Digby.

Class 94.—*Articles of all Kinds manufactured by Working Masters.*—Nil.

Class 95.—*Instruments and Processes peculiar to Working Masters.*—Nil.

The Emperor distributed the prizes at a grand ceremonial in the Palais de l'Industrie on Monday last, the 1st instant. His Imperial Majesty delivered the following speech:—

"Gentlemen,—After an interval of twelve years I have come for the second time to distribute the rewards to those who have most distinguished themselves in those works which enrich nations, embellish life, and soften manners. The poets of antiquity sung the praises of those great games in which the various nations of Greece assembled to contend for the prizes of the race. What would they say to-day were they to be present at these Olympic games of the whole world, in which all nations, contesting by intellect, seem to launch themselves simultaneously in the infinite career of progress togards an ideal incessantly approached without ever being able to be attained? From all parts of the earth the representatives of science, of the arts, and of industry, have hastened to vie with each other, and we may say that peoples and kings have both come to do honour to the efforts of labour, and to crown them by their presence with the idea of conciliation and peace. Indeed, in these great assemblies, which appear to have no other object than material interests, a moral sentiment always disengages itself from the competition of intelligence—a sentiment of concord and civilisation. In drawing near, nations learn to know and to esteem each other; hatred is extinguished, and the truth becomes more and more evident that the prosperity of each country contributes to the prosperity of all. The Exhibition of 1867 may justly be termed universal, for it unites the elements of all the riches of the globe; side by side with the latest improvements of modern art appear the products of the remotest ages, so that they represent at one and the same time the genius of all ages and of all nations. It is universal, for, in addition to the marvels luxury brings forth for the few, it displays also that which is demanded by the necessities of the many. The interests of the la-

bouring classes have never aroused more lively solicitude. Their moral and material wants, their education, the conditions of life at a cheap rate, the most productive combinations of association, have been the object of patient inquiries, of serious study. Thus all improvements march forward. If science, by turning matter to account, liberates labour; the cultivation of the mind, by subduing vices, prejudices, and vulgar passions, also liberates humanity. Let us congratulate ourselves, gentlemen, upon having received among us the majority of the sovereigns and princes of Europe, and so many distinguished visitors. Let us also be proud of having shown France as she is—great, prosperous, and free. One must be destitute of all patriotic faith to doubt of her greatness; must close one's eyes to evidence to deny her prosperity; must misunderstand her institutions, tolerant sometimes even of license, not to behold in them liberty. Foreigners have been able to appreciate this. France—formerly disquieted, and casting out her uneasiness beyond her frontiers—now laborious and calm, always fertile in generous ideas, turning her genius to the most diverse marvels, and never allowing herself to be enervated by material enjoyments. Attentive minds will have divined without trouble that notwithstanding the development of wealth, notwithstanding enticements towards prosperity, the fibre of the nation is always ready to vibrate as soon as the question of honour and the country arises; but this noble susceptibility could not be a subject of alarm for the repose of the world. Let those who have lived for a short time amongst us carry to their homes a just opinion of our country; let them feel persuaded of the sentiments of esteem and sympathy we entertain for foreign nations, and our sincere desire to live at peace with them. I thank the Imperial Commission, the members of the jury, and the different committees, for the intelligent zeal they have displayed in the accomplishment of their tasks—I thank them also in the name of the Prince Imperial, whom, notwithstanding his tender age, I have been happy to associate in this great undertaking, of which he will retain the remembrance. I hope the Exhibition of 1867 will mark a new era of harmony and of progress. Assured that Providence blesses the efforts of all who, like ourselves, desire good, I believe in the definitive triumph of the great principles of morality and justice, which, while satisfying all legitimate desires, are alone able to consolidate thrones, to elevate nations, and to ennoble humanity."

THE MACHINERY AT THE PARIS EXHIBITION.

The arrangements for ventilating the building consist in a system of circular and radiating underground galleries. The 16 radiating galleries communicate with the outer air by means of 16 air shafts, down which the air is drawn by the assistance of the artificial current produced by an air jet placed in each of these radiating galleries, and distributed throughout the building by means of a number of air-grates in the flooring. The compressed air is supplied to these air jets through pipes, varying in diameter from one to two feet. The quantity of air passing through the jets is regulated by a valve in form of a disc, the maximum opening of which is 130 square centimetres, with a speed of 6 ft. 6 in. per second.

The total force employed in compressing air is 105 nominal horse power, arranged as follows:—

The first is a 15-horse power portable engine, by Messrs. Farcot and Sons, of St. Ouen, driving two air-fans, constructed by M. Perrigault; these supply two air jets. The next four air jets are supplied by a horizontal engine of 25-horse power, by Messrs. Gargan, of Paris, working three exhausting cylinders, 2′ 8″ in diameter, with 2′ 1″ stroke, situated in the Belgian boiler-house. Four other air jets are supplied by two large air fans, by M. Perrigault, from the shafting in the Austrian section of the machinery gallery, driven by a horizontal engine of 25-horse power. The air is supplied to the remaining six air jets by means of blowing cylinders, 4 ft. in diameter, with 2′ 8″ stroke, by Messrs. Gauthier and Phillipon, driven by horizontal engines of 40-horse power, situated in the park, near the Egyptian temple.

The spinning and weaving machinery occupies a large space in the French section. Messrs. Stehelin and Co., of Bitschwiller (Haut Rhin), exhibit a self-acting mule for cotton-spinning, with 442 spindles. The cotton passes from the bobbin between four rows of rollers to the spindles; the end pair of rollers only are weighted. To give increased steadiness to the carriage, its back forms in plan a parabolic curve, instead of the back and front being parallel, as in those generally in use. They also exhibit a highly ingenious circular wool-combing machine. The wool, in ten or more slivers, is fed in between a pair of fluted rollers; it is then led forward by an endless chain of combs, arranged in a highly ingenious manner, on which it is placed by a descending brush; from this it is seized by a pair of jaws, that take it forward, and from these it is taken by a comb, and placed on the revolving circular comb; the long fibres which project outside the teeth are guided, by an endless leather strap, to a pair of fluted rollers, where a sliver is formed, and passed through the centre of a revolving hollow cone into a can; the short wool remaining between the teeth of the comb is cleared out by means of triangular plates, and passed off between fluted rollers to another can.

Messrs. Morel and Co., of Roubaix (Nord), also exhibit a circular wool-combing machine. The slivers supplied from fifteen bobbins are brought forward over the circular horizontal revolving comb, when the wool is seized by a pair of jaws and placed on the teeth of the comb by a descending brush; the long fibres that remain outside the comb are guided by an endless band of leather between fluted rollers, and the sliver thus formed is led away to the can. In this machine there are two feeds opposite each other, and two slivers of long wool are formed on each side. The short wool is guided from between the combs by triangular cleaners and taken to cans. The circular comb is formed of eight concentric rows of teeth placed on a revolving cylinder, inside of which a projection is cast, forming cam motions, by which the jaws and brush receive their respective movements.

A most effective machine is exhibited by M. Buzzon, for preparing woollen or other rags for recarding or for paper making. The rags are fed, by means of an endless feed-cloth, between iron rollers, the bottom one of which is covered with india rubber, within range of a drum making about 1,000 revolutions per minute, covered with steel teeth, resembling those of a circular saw; the top feed roller is kept clear by means of a knife, which prevents the wool being wrapped round it. The drum is cleared of wool on the delivery side by a circular brush. This machine requires about $1\frac{1}{4}$ horse power, and prepares from 300 lbs. to 400 lbs. per day.

M. Vouillon, of Louviers (Eure), shows a machine for the production of "fils feutres," threads which are not spun but felted. The thirty slivers from the condenser are passed, on an endless felt band, covered with linen, under four wooden rollers covered in a like manner. These rollers have a backward and forward motion across the endless band which rubs the slivers into yarn. A steam-pipe is introduced between the first two rollers, for the purpose of heating the wool, in order to facilitate the operation of straightening the fibres.

Messrs. Radiquet and Lecêne, of Paris, exhibit several circular stocking frames, in which, by aid of electricity, when a thread breaks the machine is stopped.

A highly ingenious machine for making fishing-nets is exhibited at work, by Messrs. Jouanin and Co., of Paris. In this machine the bobbins containing the warps are placed on a frame at the back of the machine, and correspond with the number of meshes in the width of the

net; it passes over guide-pullies, so arranged as to keep the threads in a horizontal line, to a roller round which it is wound once, at the front of the machine. In the interval between the guide-rollers and the front roller is a sinker, formed of a horizontal bar, carried by two levers on a rocking shaft, and so counterbalanced as to take up any slack in the warp-thread, and yet to rise when the threads are pulled very tight, as is done in a certain part of the knotting process. The loops of the warp are engaged by a row of horizontal hooks, each of which works upon its axis by means of a long rack. The weft-thread, which is contained in a row of spools placed each in a sort of shuttle in front of the machine, is passed through the loops previously formed in the warp, and in this manner the knot is formed, each shuttle being so guided by the frame by which it is moved to form its proper knot and mesh. This machine works with such precision that the thread is never frayed, and the knot of the mesh is never too tight; this is considered to be an advantage for the operation of tanning, the liquid being able to soak in more readily. The speed of this machine is twelve revolutions per minute, which would give 7,920 rows of knots in a day of eleven hours if the machine were not stopped for the re-filling the spools.

Messrs. Schneider, Legrand, Martinot, and Co., of Sedan (Ardennes) show a machine for calendering or preparing cottons or linens for the calico-printer, in which the fibrous down is removed from the surface of the cloth by passing the piece rapidly over the surface of a series of steel plates, with small teeth; these blades act in the same manner as saws, and have a backward and forward motion across the piece, which is drawn over them at the rate of 450 yards per hour. The first blades have 30 teeth to the inch, and the finishing blades 40 to the inch.

The same firm also exhibit a shearing machine and a teaseling machine for cloths and woollens.

Messrs. Hermann, Devinck, Debatiste all exhibit excellent machinery for grinding and preparing chocolate. In the machines constructed by the first, the table and stones are all in granite.

The motive power in the Belgian section has been supplied by Messrs. Houget and Teston, of Verviers, from whose plans the boilers were constructed by Messrs. Petry and Chandoir, of Liège. Each boiler is constructed with the grates leading into the same combustion chamber, and, if care is taken in firing alternately each furnace, the smoke produced by the fresh combustion is burnt. The gases thus pass through the tubes, of which there are 75. The engine supplied by Messrs. Houget and Teston is of 50 nominal horse power. It has two horizontal cylinders, and can be worked either with or without the condenser. The shaft is well balanced by a fly-wheel at each extremity, and the whole is very compact.

Messrs. Houget and Teston also exhibit in motion a series of machinery for preparing wool for spinning; and their carding engines, fitted with Messrs. Apperley and Clissold's diagonal feeders, are of excellent workmanship. The object of this feeder is to lay and deliver the fibres crosswise to the finisher card, to be again straightened by the taker-in rollers. The same firm also show shearing and fulling machinery for cloths and woollen goods. M. Celestin Martin, of Verviers, also exhibits highly ingenious machinery for the preparation and spinning of wool. The first machine, for the purpose of cleaning and oiling the wool preparatory to being carded, is very complete. From this it is taken to the first carding engine and formed into a single sliver or ribbon; forty of these slivers are then transferred to the second carding engine and formed into a single ribbon. This sliver—of larger size than the previous one—is laid backwards and forwards across the endless lattice of the condenser, so as to form a continuous fleece. The novelty in this machine is the mode of dividing the fleece. This is effected by steel springs placed between the cylinder and the doffer, and the strips pass between two endless bands of leather or rubbers, having an alternate motion across the threads. This machine forms 60 good threads and two wasters at each side. An excellent self-acting mule is also exhibited by this firm.

A colliery winding engine of 200 horse power is exhibited by Messrs. Dorzée and Andry, of Boussu, near Mons.

The Society John Cockerill, of Seraing, exhibit a vertical blowing engine for blast purposes; the blowing cylinder is nine feet in diametee.

In the Prussian section Krupp's big gun attracts a great deal of attention. It is a rifled breech-loader, of cast steel, weighing 50 tons; the carriage, which also is entirely of steel, weighs upwards of 15 tons. The diameter of the bore is 14 inches, and the number of grooves of the rifling is 40. A special railway truck was constructed for the transport of this immense piece of ordinance from Essen.

M. Thomas, of Berlin, exhibits some excellent cloth shearing machines with spiral cutters.

In the Austrian department a double carding engine is exhibited by M. Girardoni, who places two carding cylinders one above the other instead of side by side, and in this manner effects a considerable economy of floor space.

The Italian section, which until quite lately was unarranged, is now in order, and the splendid collection of ores, in class 40, shows the immense mineral resources of this country. Westerman and Co., of Genoa, show a small pair of horizontal screw engines. Ansaldo and Co., of Sampierdarena, exhibit a trunk piston, connecting-rods, one finished and the other a rough forging, for a marine engine of 660 horse power. There are a good many silk winding machines, but these do not present any novelty in design. A goods waggon and several parts of engines, such as axles, springs, etc., of excellent workmanship, are exhibited by the Roman Railway Company.

The large three-cylinder marine engine, of 960 horse power, made in the workshops of the French imperial navy at Indret, are at work every day. Messrs. Schneider and Co., of Creusot, are well represented in their annexe near the Porte de l'Université. They exhibit three locomotives, two marine engines, a horizontal colliery winding-engine, machine tools, specimens of iron-coal, drawings of engineering works that have been constructed by the firm, plans of workmen's cottages in the commune of Creusot, etc.

This immense establishment, including mines, collieries, &c., occupies an area of nearly 300 acres, of which $47\frac{3}{4}$ acres are covered with buildings. The number of workmen employed on their works is 9,950, with a total engine power of 9,750 horses.

The first locomotive is an express engine, constructed for the Great Eastern Railway (England), from drawings furnished by Mr. R. Sinclair. The next is a goods engine, for the Creusot Railway. And lastly, a small engine for a mineral line of 3ft. 4in. guage, and weighing about six tons. Since 1838 the Creusot iron works have constructed 1,100 locomotives. The first marine engine is of 950 nominal horse power, for the iron-clad *L'Océan*. It is of the type now adopted by the imperial navy, with three cylinders 84in. in diameter with 4ft. 4in. stroke. The actual power is 3,800 horse, making 55 revolutions per minute. The steam is admitted at high pressure in the middle cylinder, and afterwards allowed to expand in the two others, on the Woolf principle. The slide-valves are moved by an independent crank shaft, situated above the main shaft, so as to avoid the necessity of eccentrics and give more bearing surface. Another marine engine is of 265 nominal horse-power, forming one-half the engine power of the coastguard iron-clad ram, the *Cerbère*, of the imperial navy. The two cylinders are 48in. in diameter, with 2ft. 4in. stroke.

In the Wurtemberg annexe, Messrs. Decker, Brothers, and Co. exhibit Henry Völter's patent machinery for

the manufacture of wood pulp for paper-making. This machinery is driven by three portable engines, of the united power of 50 horses. It consists principally of the "defibrer," or grindstone, by which the wood is reduced into fibre, whilst water is continually running over it. The wood is held firmly, and pressed against the stone by a self-acting mechanism, and ground into a mass of fibre. It then passes through a coarse sorting apparatus, in which the splinters of wood are removed. This apparatus separates at the same time the coarse part of the fibre, and conducts it to the refiner, and it also serves for the mixing of the coarser pulp. The refiner consists of a pair of millstones, between which the pulp is ground; it then passes to the sorting apparatus, consisting of a series of cylinders, covered with wire gauze. The different qualities of pulp are sorted according to the degree of fineness, and the different qualities are delivered into tanks. Eighty of these machines have already been constructed, and supplied to various parts of Europe.

The Swiss section contains a good supply of cotton-spinning machinery by Messrs. Rieter and Co., of Winterthur (Zurich), consisting of scutching and lapping machines. The process of double carding is exhibited, that is to say the carding of the cotton in two carding engines only, the "breaker," and the "finisher," with the intermediate process of doubling.

The "breaker" carding-engine is provided with six workers and cleaners; the cotton is taken in the usual manner, by means of a comb, or toothed steel plate, which is made to vibrate in front of the doffer, removing the cotton in a light fleece, the full width of the doffer; the fleece is contracted and drawn through a tube by means of a pair of rollers, and the slivers thus formed are delivered and coiled in a cylindrical tin can, revolving slowly on its own axis.

Twenty-four cans, containing the slivers thus formed, are arranged at the back of the lap doubling machine. The slivers are passed through two pair of callender rolls, and the laps thus formed are wound upon a light wooden bobbin placed in the channel between a pair of fluted rollers; each sliver is provided with a stopping motion, so that if any break, the machine is stopped, and in this manner waste and spoiled work is prevented. Four of the laps thus formed are placed end to end on the finisher card, which is mounted with twenty-four self-stripping flats, on Wellmann's system. The fleece is removed from the doffer in the usual manner, and formed into a sliver, which is coiled in a can revolving on its axis. The drawing frame consists of a series of rollers, through which eight slivers are drawn into one, and deposited in a coiling can. The slubbing frame, in which the sliver is twisted for the first time, is of forty spindles, with the usual bobbin and fly action. The intermediate frame is of 72 spindles, and the roving frame of eighty spindles, with the usual three pairs of drawing rollers each. The rovings from this last are spun into yarn on a self-acting mule.

Messrs. Wegmann and Co., of Baden (Switzerland), exhibit five silk throwing machines of excellent workmanship and arrangement.

M. Honegger, of Ruti (Zurick), some well-made looms for silk weaving.

An important and simple machine is exhibited by M. S. Golay, of Geneva, for dressing and preparing mill stones. The cutting tool consists of a black diamond, held in a notch between two circular steel plates, about three-quarters of an inch in diameter, screwed up tight together, on a small steel mandril, making about 2,000 revolutions per minute. An upright standard is fixed in the centre of the stone, with a long horizontal jib, on which the carriage holding the cutter is made to traverse by means of a screw and hand wheel. In dressing a stone by means of this machine a great economy of time is effected, as compared with hand-dressing, and the work is done with greater accuracy. The diamond, costing four to five shillings, is stated to last about a year.

The United States Sanitary Commission, or rather Dr. Thomas W. Evans, in a small building near the Porte de l'Université, shows an interesting collection of articles for the relief of the sick and wounded, and which rendered great service during the late civil war. Besides several ambulances, in one of which about three thousand soldiers were transported during the war, a model of a railway ambulance, or "hospital car," is shown. This model is a fac-simile of the hospital cars employed by the United States Sanitary Commission on the railway between Washington and New York, as well as on several other military railways in other parts of the States. In this model everything is shown. Couches, of which there are 30; dispensary wine closet; water closet; system of ventilating and heating, &c., as was employed in the construction and equipment of these cars; and externally it represents perfectly the construction of an American passenger car. It is provided with a patent safety break, and a set of self-acting ventilators. The couches are hung from pins in the uprights, by means of four strong rings of vulcanised india-rubber, and in this manner an easy movement is secured with an almost entire absence of concussion, even over the roughest roads. Besides ambulances, several medicine waggons, field dispensaries, models of hospitals, hospital tents, hospital furniture, and surgical instruments, are shown.

Fine Arts.

Arundel Society.—Mr. Layard M.P., in the absence of Lord Elcho, took the chair at the last annual meeting of this society. In opening the proceedings he dwelt on the favourable aspect of the report. The number of members under the recent reconstruction is likely, in the course of the year, to be doubled, and the annual receipts have now reached upwards of £5,000. This growth in resources has enabled the society to extend the sphere of its operations. In the course of the present year two series of publications will be issued, in place of one, to the first and second class of subscribers respectively. These will include chromo-lithographs from frescoes by Raphael, Ghirlandaio, and Razzi. Mr. Layard has kindly undertaken to write for the society a descriptive notice of the Brancacci Chapel, which will be distributed among the members, with the closing illustration of that rich repository of mural decorations. It is anticipated that this critical notice may settle certain historic questions as to the authorship of the frescoes, which have long been subject of doubt. The balance-sheet of the society shows that the arrangement made with the Department of Science and Art for the sale of photographs has lately been brought into successful operation. Among the most important works now in course of execution are chromo-lithographic reproductions of Van Eyck's celebrated picture, "The Adoration of the Lamb," together with the accessory side panels, or painted doors. Also specimen drawings have been made by Signor Mariannecci of Michael Angelo's "Prophets" and "Sibyls" in the Sistine Chapel. In these and other copies Signor Mariannecci has been directed by the council to transcribe more literally than heretofore the ancient frescoes in their actual state of decay. This instruction was given in consequence of the dissatisfaction expressed by many of the members at the modern aspect imparted to professed fac-similes of ancient works. The project, of which we gave notice some weeks since, to reproduce in chromo-lithography a selection from the sepulchral monuments of the middle ages, is in course of being carried into effect. As examples of the successful combination of architecture, sculpture, and pictorial or other surface enrichment, the sepulchral monuments of Italy are deemed to be unrivalled. Accordingly the council of the Arundel Society have engaged Professor

Snauth, of Stuttgard, to make careful copies in colours or monochrome of two valuable monuments in the church of San Giovanni e Paolo, Venice. A favourable specimen of the Professor's works, together with other interesting drawings recently executed, may be seen in the Society's rooms, Old Bond-street. In the prosecution of these important undertakings the Society will obtain valuable assistance through the accession of Mr. Street to the council.

Manufactures.

Steam-engines for Common Roads.—Great efforts are being made in France to introduce steam trains on common roads, for the transport both of goods and passengers, and a company has been formed to carry out the plan on a large scale. Some experiments have been tried in Paris, Nantes, and elsewhere, and the Universal Exhibition, where there is a large collection of traction and other engines of nearly all nations, has given a fresh impulse to the movement. The object in view in France is different to that in England, the loads to be moved are generally lighter, and there is a want of more passenger conveyance at low rates; the engines required are therefore less powerful but faster. The difficulty to be surmounted is the provision of a reserve force for hills and bad pieces of road; several attempts have been made to meet this, and one engine now at the Exhibition, the invention of M. Larmanjat, is said to have solved the problem. When it is desired to increase the power of the engine the two ordinary driving-wheels are thrown out of action and replaced by others, which are so arranged that the substitution can be made in less than a minute; in fact, the speed is reduced from seven or eight to about two miles per hour, while the rate of working of the parts of the machine itself remains the same. The engine now at the Exhibition has been seen more than once on the boulevards around the Champs de Mars, drawing a small omnibus in its train, and although it has only the nominal force of three horses it seems to do its work effectively, it certainly manœuvres with great ease, and we have seen it mount and descend the Pont d'Alma with great apparent ease. It is reported of it that its first trial took place at Auxerre, where it drew a low-wheeled truck, such as are employed in the streets of Paris, carrying about 1½ ton of goods and 27 persons, making in the whole a load of three tons, going up a long road with a rise of 8 in 100; the average speed, going and returning, was five miles an hour. It is said also to have performed the journey between Auxerre and Avallon, the distance there and back being nearly seventy miles, drawing a very heavy diligence containing fifteen persons; the road presents inclines, varying from 3 to 5 in the 100, and the average speed effected was nearly seven miles an hour. The expenditure for the journey is given at 21 francs (16s. 10s.). The engine has made several excursions around the Champ de Mars, drawing an omnibus carrying eighteen or twenty persons with comparative ease, and it is reported that it has performed about a hundred miles without the slightest disarrangement.

Commerce.

The Wool Trade.—The Paris correspondent of the *Times* says:—"Some statements lately prepared with regard to the results of colonial and foreign sheep farming show that, while the production of wool in Australia had increased from 55 million pounds in 1859 to 114½ millions in 1866, or 108 per cent., that of the River Plate—where the same kind of wool is grown, but which is practically unused in England—increased from 42 millions to 155 millions, or 269 per cent. English woollen manufacturers at present depend almost exclusively for their supply of fine wool upon the growth of Australia and the Cape, while Continental manufacturers use all three kinds, according to the current value of each. If English consumers, it is remarked by Messrs. J. L. Bowes and Brothers, of Liverpool, would do the same, greater evenness of price would result, without acting prejudicially to the interest of colonial growers. It may be urged that English consumers do not like to use River Plate wool on account of the 'burr,' but it is ridiculous to let a slight mechanical difficulty prevent the use of a wool which, in a few years, will be more abundant than that of any other country. It is mentioned as a well-known fact that Belgian spinners frequently buy burry Buenos Ayres wool in England, take it to Belgium, pick out the burr with a machine invented and often made in England, and, having spun the wool into yarn, return it into England and Scotland for sale and consumption."

Colonies.

Harvest in Australia.—The returns as to the wheat harvest show that the total crop was about 6,500,000 bushels, which gives a surplus for export of 104,000 tons. In Victoria, too, the yield has been very abundant. Under these circumstances the question of an European market for Australian corn is becoming one of momentous importance to the colonial farmers. The glutted state of the wheat market, together with the effects of the drought on sheep farming, and the closing of the Burra mines have given rise to much discussion on the question of new industries.

Publications Issued.

Official English Version of the Catalogue of the Paris Exhibition *(J. M. Johnson and Sons)*.—A second edition of the English general catalogue has been issued. It is greatly improved and enlarged, but without any increase of price. The new edition contains 1,008 pages, exclusive of advertisements; it is well printed, and exhibits in all respects great care in its production. This new issue is prefaced by a map, printed in colours, and showing not only the place of each country within the Exhibition building, but the position and object of the numerous structures in the park. There is also, in addition to a full general table of contents, a tabular index, specially arranged in such a way that the visitor may either examine the Exhibition class by class or country by country; this is effected, in two pages, by giving in one column the names of all the exhibiting countries, and in 94 other columns the number of the page of each country in each class. It may be added that while the editor of the French edition has only divided the exhibits of each country by groups, Mr. Yapp, the compiler of the English translation, has adhered strictly to the classification, giving the contributions of each country under each class.

Notes.

Aeronautical Experiments in France.—The first ascent with Nadar's great balloon, the "Géant," was made recently from the esplanade of the Invalides, in Paris. Besides the captain, assistant-captain, and two men, there were in the car M.M. Sourel and Simonin, members of the Meteorological Society of France, and M. W. de Fonville, scientific editor of *La Liberté*. There was some difficulty in getting the great machine to rise, and one person was compelled to descend before the buoyancy was sufficient, but at last the great balloon rose majestically and was soon lost in the clouds. The trip was merely experimental, and M. Simonin records the

few facts observed. The balloon entered the clouds at 650 mètres above the earth, and in five minutes after, having ascended 350 mètres more, the aeronauts were in full sunlight. The total altitude attained was 1,030 mètres; the mercurial barometer marked 674 millimètres, the thermometer 16° centigrade, the hair hygrometer 88¼. At the surface of the earth before starting the pressure of the air had been 760 millimètres, the temperature 18°, and the humidity 82. The trip only lasted one hour, and the balloon descended at Chilly, four leagues from Paris, without any further accident than the breaking of a thermometer, the uprooting of an apple-tree, and the knocking off the coping-stones of a wall. The direction was due south, and the force of the wind 18 kilomètres, or more than eleven miles an hour. Besides the instruments in the charge of the aeronauts themselves, there were others in the car which were sealed; these were specially contrived by M. Regnault to check the records of the former, and were not to be opened until returned to the College of France. Another ascent is to be made with the same balloon in a few days. On the same day M. Flammarion made a third ascent in the smaller balloon of the Association.

Proposed Memorial Statue for the Isthmus of Suez.—M. Faustin Glavany, Secretary in the Turkish diplomatic service, and deputed by the Sultan to represent his Government at the Archæological Congress of Antwerp, has just published a project for a commemorative monument to be erected at the entrance of the canal of the Isthmus of Suez. This monument, which the author proposes to call the Temple of Peace, is to be in the form of a pyramid, as characteristic of Egyptian architecture. On the apex of the pyramid is to be a statue of Peace, bearing in one hand a flambeaux, and in the other an olive branch, and on the four sides of the pyramid, and its base, inscriptions in Coptic, Hebrew, Greek, Arab, Latin, French, Assyrian cuneiform character, and Turkish, with sixteen escutcheons, bearing the names of maritime nations or their sovereigns.

Correspondence.

Rating of Institutions.—Sir,—You will perhaps recollect that some months ago a movement was set on foot by the Council of this Institute to obtain exemption from the assessment of Institutions like ours to the Inhabited House Duty, except for those portions actually occupied as dwellings. I have now the pleasure of informing you that the Lords of the Treasury have, on the recommendation of the Board of Inland Revenue, issued an authority for the limitation of the assessment of public buildings devoted to the culture of science, literature, and art, to such portion of the building beneficially occupied as a dwelling, when such portion is of the annual value of £20 or more. Would you kindly notice this in the *Journal* of the present week for the benefit of the managers of other Institutions.—I am, &c., Edwin Smith, *Secretary*.

Birmingham and Midland Institute, 2nd July, 1867.

MEETINGS FOR THE ENSUING WEEK.

Tues ...Ethnological, 8. 1. Mr. J. Thomson, "On the Ethnology of Cambodia, with some account of the Jacoons of Jahore." 2. Mr. H. C. Creswick, "On the Syllabic Characters in use among the Key Negroes." 3. Mr. G. M. Sprout, "On the Probability of a Stone Age."

Wed ...Royal Literary Fund, 3.

Patents.

From Commissioners of Patents' Journal, June 28th.

Grants of Provisional Protection.

Artificial limbs—1663—T. Brown.
Axles, &c.—1727—J. H. Snelson.
Balloons—466—M. Henry.
Brooches, fastenings for—1703—J. H. Kerly.
Brushes—1679—J. Sheldon.
Candle-making machinery—1689—J. C. Ralston.
Carriage step cover and wheel fender combined—1721—J. Millward.
Carriages, &c.—1681—J. Offord.
Chaff-cutting machines, portable—1665—R. Maynard.
Coal-cutting and rock-boring engines—1704—F. B. Dœring.
Cranes, working, regulating, and controlling—1680—A. Barry.
Cruet frames, &c.—1711—C. Toft.
Dredging apparatus—539—H. A. Bonneville.
Flax, &c., heckling—1719—W. Rowan.
Furnaces—1735—J. Glover.
Gas, apparatus for registering quality of—1684—J. Warburton.
Gas-cooking apparatus—439—W. Hill and H. C. Wilberforce.
Gates and fences—1667—G. R. Turner and W. T. Allen.
Gun-barrels—1687—F. Glisenti.
Horses, &c., roughing—1699—W. French.
Hot-water apparatus for heating and warming—1673—H. Crowe.
Inkstands—1669—C. E. Giojola, J. H. Gray, and P. Martinengo.
Jewellery, articles of—1731—A. C. Lion.
Knife cleaner—1693—O. Barrett and H. Leggott.
Knitting heads—1638—J. Collier, R. Howarth, and W. Cryer.
Liquids, apparatus for raising—1427—A. M. Clark.
Looms—1725—D. Crichton, W. Donbavand, and D. Crighton.
Looms, arrangement of reeds used in—1675—D. Rorison.
Lubricators—1035—J. C. des Roseaux.
Meat, &c., preserving—1493—E. H. C. Monckton.
Motive-power, obtaining—1691—J. Hargreaves.
Mustard, application of for curative purposes—1212—E. Guenin.
Ornamental bricks—1569—H. Pether.
Paper, &c., ornamenting surfaces of—1695—A. Parkes.
Pipes or tubes, unions for—1694—N. Thompson.
Plastic and fibrous materials, moulding—1700—J. Macintosh.
Pontoons—1723—J. Cochrane.
Printing-type, arrangement of—1631—E. Tayler.
Punching, cutting, and embossing apparatus—1702—A. L. Dowie and R. McIntyre.
Railway points and signals, compound lever for working—1579—T. F. Cashin.
Railway tickets, machines for dating or printing—1659—J. Adams.
Rotary pumps—1671—A. L. Bricknell.
Seeder, cultivator, and roller combined—1571—E. T. Hughes.
Sewing machines—1677—E. T. Hughes.
Sewing machines—1690—H. Willis, G. Rice, and A. Maxfield.
Shoe-brushing apparatus—1483—G. Haynes.
Spring hooks—1657—I. Evans.
Stamping machine—1692—J. Turner and R. B. Dunnett.
Steam-boilers, fitting tubes in flues of—1678—W. W. and J. Wood.
Steam-engines—1661—E. Bland.
Steam-ferry for ocean transit of railway trains—1503—E. H. C. Monckton.
Thrashing machines, &c.—1709—R. Hornsby, J. Bonnall, and H. Shield.
Tobacco pipes—1686—H. Parker.
Watches—1114—S. Harrison.
Window blinds, &c., securing cords, &c., used in raising—1696—R. E. Pepys and J. Warburton.
Woollen cloths, manufacture of—1683—R. Scott, J. Nixon, and J. Beaumont.
Zinc, manufacture of—1701—T. Robinson and J. Pierce.

Inventions with Complete Specifications Filed.

Diary blotting pad—1832—J. H. Kearns.
Sewing machines—1810—H. Oram.
Textile fabrics, dyeing black—1825—R. W. Morrell.

Patents Sealed.

3424. C. Harrison.
3435. C. Sheridan.
3436. W. Exall.
3446. J. T. Griffin.
3447. G. P. Pocock.
3. A. D. Campbell.
6. H. A. James.
19. J. K. Broadbent.
20. W. G. Helsby.
47. W. Way.
57. R. Winder.
79. H. Buss.
803. J. W. Yates.
819. J. Greenshields.
857. T. Peabardy.
963. J. Whitworth.
964. J. G. Jones.
1001. J. H. Barker.

From Commissioners of Patents' Journal, July 2nd.

Patents Sealed.

15. J. W. Kenyon.
33. D. Dowling and C. Greves.
50. W. Martin.
51. R. Robinson.
52. E. C. Prentice.
54. J. H. Johnson.
56. W. J. Murphy.
116. W. Howarth and M. and J. Pearson.
182. J. H. Johnson.
285. W. E. Newton.
288. J. Darling.
379. W. Clark.
991. J. Whitehurst & T. Walsh.

Patents on which the Stamp Duty of £50 has been Paid.

1609. W. F. Thomas.
1616. T. Thomson and J. Murray.
1620. W. Clark.
1623. H. A. Bonneville.
1630. F. J. Bugg.
1614. C. J. Tinker.
1635. J. Coombe.

Journal of the Society of Arts.

FRIDAY, JULY 12, 1867.

Announcements by the Council.

Society's Visit to the Paris Exhibition.

The Council have directed the Secretary to make arrangements for a visit of the members of the Society to the Paris Exhibition. The period fixed for the visit has been extended from Monday, the 29th of July, to Friday, the 16th of August, in order to include the Napoleon fêtes. A reception-room has been provided for the use of the members during their stay, where their correspondence may be addressed, and where they will have the convenience of writing letters, making appointments with their friends, and where notices of all arrangements for visits to various places will be suspended. Lists of hotels and apartments will also be provided there for consultation.

A programme is in the course of preparation. Members contemplating visiting Paris at this time are requested to send in their names to the Secretary, in order that cards of membership and programmes may be furnished to them.

Artizans' Visits to Paris.

Her Majesty's Government have granted to the Society of Arts, in aid of the fund now being raised by the Society for assisting workmen, specially selected from various trades, to visit and report on the Paris Exhibition, the sum of £500, conditional on the Society raising a like amount by public subscription.

The following is the list of subscriptions up to the present date :—

H.R.H. the Prince of Wales, President	£31	10	0
Her Majesty's Government (conditional)	500	0	0
Society of Arts	105	0	0
Earl Granville, K.G.	5	0	0
Lord de L'Isle	10	0	0
Thomas Twining	2	2	0
Sir J. P. Boileau, Bart.	5	0	0
George Godwin, F.R.S.	1	1	0
Vice-Chancellor Sir W. Page Wood, F.R.S.	10	0	0
W. H. Bodkin (Assistant-Judge)	3	3	0
Sir Rowland Hill, K.C.B.	3	3	0
Benjamin Shaw	2	2	0
Alfred Davis	10	10	0
Eugène Rimmel	5	5	0
Frederick Mocatta	2	2	0
James Marshall	2	2	0
Robert Dawbarn	1	0	0
Henry Vaughan	10	10	0
Philip Sancton	5	0	0
Somerset A. Beaumont	5	0	0
Decimus Burton, F.R.S.	1	0	0
W. Botly	1	1	0
Professor Robert Bentley	2	2	0
John Stuart Mill, M.P.	1	1	0
G. F. Wilson, F.R.S.	2	2	0
Henry Creed	1	1	0
The Marquis of Salisbury, K.G.	10	0	0
D. Roberton Blaine	2	2	0
William Hawes	2	2	0
Seymour Teulon	1	1	0
G. N. Hooper	2	2	0
Lord Taunton	5	0	0
Henry Cole, C.B.	1	0	0
A. Robb	1	1	0
S. Andrews	1	1	0
Thomas Dixon	1	1	0
Charles Telford	1	1	0
Edmund Burke	2	0	0
W. H. Gore Langton, M.P.	5	0	0
J. R. Fowler	1	0	0
John Rutson	1	1	0
W. Fothergill Cooke	2	2	0
J. P. Gassiot, F.R.S.	5	5	0
The Duke of Devonshire	10	0	0

Collected in response to a Circular issued by the Birmingham Chamber of Commerce.

G. Dixon, Mayor of Birmingham	5	5	0
Messrs. Smith and Wright, Birmingham	5	5	0
Messrs. Griffiths and Browett, Birmingham	5	5	0
Henry Weiss, Birmingham	2	2	0
W. H. M. Blews, Birmingham	2	2	0
W. Middlemore, J.P., Birmingham	5	5	0
Thomas Lloyd, Birmingham	2	2	0
Messrs. Elkington and Mason, Birmingham	5	5	0
Messrs. John Hardman and Co., Birmingham	2	2	0
Messrs. F. and C. Osler, Birmingham	5	5	0
The Proprietors of the *Birmingham Journal and Daily Post*	2	2	0
The Proprietors of the *Birmingham Gazette*	2	2	0
R. L. Chance, Birmingham	2	2	0
T. Avery, Birmingham	2	2	0
W. Tonks and Sons, Birmingham	2	2	0
W. Lucas Sargant, Birmingham	2	2	0
— Mountain (Messrs. Walter, May, and Co.), Birmingham	2	2	0
J. A. Williams, Birmingham	2	2	0
Henry Charlton, Birmingham	2	2	0
W. Bartlett and Sons, Birmingham	5	0	0
John P. Turner, Birmingham	0	10	6
W. H. Avery, Birmingham	2	2	0
Messrs. Peyton and Peyton, Birmingham	3	3	0
James Cartland, Birmingham	2	2	0
Messrs. Smith and Chamberlain, Birmingham	2	2	0
Messrs. Baker and Son, Birmingham	2	2	0
Messrs. Hinks and Wells, Birmingham	2	2	0

Subscriptions may be forwarded to the Financial Officer, at the Society's House.

The Council are now prepared to receive the names of any workmen recommended by their respective trades as fit and proper persons to undertake this important duty on behalf of their fellow workmen.

Proceedings of the Society.

Food Committee.

A meeting of the Sub-Committee on Fish took place on Tuesday, 28th May. Present: Mr. Benjamin Shaw in the chair; Mr. Ware and Professor J. Wilson.

Mr. JOHN POWELL, fish dealer, of Earl-street, Seven-dials, attended before the Sub-Committee to give information relative to the distribution of fish among the poorer classes in London, &c.

Mr. POWELL stated that he was in the habit of regularly attending the sales in Billingsgate-market, and he handed in to the Committee a copy of the return of the quantity of each kind of fish which was brought into Billingsgate-market for sale on that morning, which it appeared was issued daily on the opening of the market, as a guide to the dealers, and could be obtained by them on application to the market officials. Mr. Powell proceeded to give the following evidence in reply to interrogatories put by the Committee:—

He buys his fish in the usual way, direct from the salesmen generally, but sometimes of the fishermen—some kinds. There is a great deal of fish comes into the market that ought not to be sold, but nevertheless is sold, and distributed about London, in the streets and in shops and stalls—fish which may have been a long time on the passage in bad weather. The vessels lose their ice and the fish is spoilt. Such fish is bought by the lower class of traders and hawkers. There are two inspectors, for the purpose of preventing such fish from being sold, but they are seldom to be seen; sometimes they are not there for hours together. They are supposed to be there, but very often they are not to be seen. I have sometimes seen them condemn fish that was eatable, and at others they have passed that which was bad. All, or nearly all, the fish passes through the hands of the salesmen. It is usually sold by auction, all in a hurry, and the highest bidder for each lot of fish is the purchaser. I buy direct from the salesman, not from a middle man. The sales are for cash, but if you are known on the market you need not always pay cash. I sell direct to the consumers the fish which I buy in the market, but I sometimes send fish to dealers at Reading and Portsmouth. I sell my fish now in a shop; previously to that I got my living by selling in the streets. The quality of that generally sold from the barrows varies—some is good and some bad. That fish is generally bought direct from the market, or from persons like myself. If fish is scarce the barrowmen get it from the "cut-away" shops—these are little shops, but a great deal of business is done in them. I think there is quite as much bad fish in the large shops as in the small ones, because the large shops have ice-wells, where they keep fish for so long a time that at last it becomes bad. The small shops cannot have ice-wells.

Have you ever heard, and are you aware of the fact that a good deal of fish is sometimes destroyed in Billingsgate-market to keep up the price?—A good deal is packed away, day after day, rather than sell it cheaper. Sometimes I have seen fish condemned which was good enough for any one to eat. The fish is sent to the market on commission. One salesman makes a good price of things, and another will put them by till the next day, because he will not sell at a lower price than others. The next day they bring it out again, and if not sold then it is put away again, or, if kept too long, is sometimes condemned. A very large quantity of fish is distributed in London by hawking it with barrows. As a general rule they do not sell bad or unwholesome fish. They get it as good as the fishmongers; it all comes from the same market. Of course they buy only the cheaper kinds of fish. As regards the prices of fish sold from the barrows, and the same kinds of fish sold in the fishmongers' shops there is a great deal of difference. The fish principally sold from the barrows consists of plaice, and mackerel, and soles when they are reasonable.

What would be the difference in price between fish sold from the barrow and that sold in the larger shops?—They could get from me for fourpence as much as they would have to pay a shilling for at the larger shops, and the quality is the same, as they would be the same kind of fish, bought in the same market; the one would be just as good as the other, and out of the same vessel.

Are the best fish picked out and the refuse sold to the hawkers?—No; there is no picking out at all in the market. The fish hawker buys his direct from the salesman.

Are there not a number of middle-men, who buy fish in large quantities and sell it again to the small dealers?—There are plenty such, but it is only the people in little shops, who may not require more than a dozen of plaice or a dozen pair of soles, who buy of them. The fish carried about for sale in the country is purchased of middle-men, who send it into the country by the railways. The poor buy fish largely as an article of diet in London, and they would buy more if they could get it. The supply is not generally sufficient for the demand. I could myself profitably dispose of a larger quantity of fish than I can get—three times the quantity, at least. There is a great desire on the part of the poorer classes to eat fish if they could get it. Sometimes they get a plaice for 4d. or 6d., enough for a family of five or six people, and generally such fish as the poorer classes get is of good quality, very good, indeed. It is only in very hot weather that there is any bad fish about. That, however, does not particularly affect the fish on the barrows, it is sold so quickly. A man generally sells his barrow-load out in about two hours in the morning, between ten and twelve o'clock. The flat fish do not generally keep good longer than the round ones. The haddocks and whitings have the insides removed before they are packed for the market, and then they keep good as long as plaice and other fish.

Have you any idea at about what price per lb. you sell fish to the poorer classes when there is a pretty good supply?—Last week I sold good plaice at the rate of a halfpenny per lb., and soles at 3d. per lb.

Is there a large trade in fish in country towns by barrows?—Yes; in all the large towns there is a great deal of fish sold from barrows. In all the towns I know they have barrows.

Is not a halfpenny per lb. for plaice and 3d. per lb. for soles an exceptionally low price?—No; at the best of times I do not get more than at the rate of 1½d., and 2d. per lb. for plaice would be considered an exorbitant price. I am obliged to have a large quantity two days in the week, to serve the Jews living in my neighbourhood, and they will buy only the best quality. I am obliged to have the best plaice and soles that I can get, and I never get more than at the rate of 2d. per lb. for plaice. It is eaten by the Jews on particular days as a relish, and not as ordinary food. At this time of the year there is a great demand for good plaice.

At what price have you sold salmon this year?—At 16d. per lb. I have not much demand for salmon, because of its high price. If I could get salmon which I could sell at 1s. or 14d. per lb., I should buy it. At a higher price than that I should not get customers for it. The soles which I mentioned as having been sold at 3d. per lb. were irrespective of size. The large ones were not charged at a higher rate than the small ones. I could sell a large quantity of salmon at 1s. or 1s. 2d. per lb., but it is not often I can buy it so as to be able to sell it at that price; the Jew shopkeepers would buy it. Fish on the barrows, as I have said before, is sold very quickly. I should say there would be none left over the night. At this time of year loads of mackerel are brought into the market late in the afternoon—sometimes about six o'clock in the evening. Loads come in from Penzance, and they are generally distributed over London and sold the same evening.

Is it your opinion that it would be beneficial to have a fish market at the West-end of London?—I do think it would be a great benefit.

The large fishmongers think it would be a great disadvantage, as it would divide the market, and involve their being buyers at each market?—That is very good on their side.

What do you consider would be the advantage to you personally?—There would not be so many people go to

one market; and you would know better what you are buying.

Do you think a second market would tend to lower the price of fish generally to the public?—Yes.

Why so?—Because it would compel them to sell the fish, and not keep it hanging on hand all day, or storing it away till the next day.

It would relieve the trade of Billingsgate to some extent, would it not?—There would be only three buyers instead of six for every lot of fish offered.

The great dealers would be obliged to have representatives at each market, and the prices would be telegraphed between the two?—They would be obliged to go to both markets, and that would be a trouble to them.

How is the great bulk of the fish brought into Billingsgate?—By the vessels, and by train. The fish brought by the vessels is generally in the best condition at market, better than that brought by the railways. The fish, when caught, are laid on the cool gravel which the boat has for ballast, and they are not injured, as is the case—particularly with mackerel, which is a very tender fish—by being packed closely together in pads. A pad of mackerel is very soon injured to the extent of 5s. Sometimes out of a pad of 60 mackerel as many as 30 are broken. There are no steamers employed in this service, except those of Hewitt and Co., who have three, I believe; the others are sailing boats. The herrings are mostly brought by train on the Great Northern and Great Eastern Railways, from Yarmouth and Grimsby. They are not of a more perishable nature than mackerel. Very large quantities of fresh herrings are, in the season, brought from Norway. They are packed in boxes, with plenty of ice, and they generally arrive in good condition, and perfectly fresh.

Is there much loss from fish becoming bad in hot weather?—I do not lose much myself from that. At times there are losses of that kind, but I think not often, as the people will sell it cheap rather than have it spoilt. The dealers know what their ordinary consumption is, and they regulate their stock accordingly; but when fish is cheap they buy larger quantities. They sell cheaper, rather than let the fish spoil by keeping. The high-price fishmongers keep the fish in their ice-wells as long as they can. I have sometimes seen fish which has been in ice perhaps for a week, and I should think it would not be very good then.—In reply to further inquiries, the witness stated that a very large trade is done in London in fish for frying, and inferior quality was often bought for that purpose. Broken fish were had by all dealers alike, and they are not sorted out and reserved for the hawkers especially; the large dealers get them as well as the small ones. The market is open to all who choose to buy, and any member of the Committee could go to the market and buy, if he did not object to the pushing and hustling about. The small dealers have an equal chance of buying with the large fishmongers if they are willing to give the price. A large supply of fish daily by the railways would no doubt soon have the effect of cheapening the price of fish in London. He had no doubt treble the present supplies would readily find purchasers. The price of fish had of late years increased fully tenfold. The wholesale prices were very greatly increased for all descriptions of fish—certainly more than double within the last ten years, and the number of buyers seemed to increase in proportion as the supply of fish increased. No matter how much fish was brought into the market, it would all be sold if reasonable prices were taken. The larger quality of soles were packed in trunks, and the smaller in pads; the former fetched the highest prices. Those in the trunks would weigh from three-quarters to two lbs. each. Fish was sent every morning from the market into the country to towns all round London. It was bought and sent off by agents for the purpose, and the persons to whom it was conveyed met the train on its arrival, and took their baskets of fish. Very large quantities are disposed of every day in that way, which helped to reduce the supply for London itself. Large quantities are sent daily to Portsmouth and Brighton, as well as to other towns. All the fish caught at Brighton is bought wholesale on the beach, by the agents of London dealers, and paid for on the spot; and the fishermen prefer disposing of their fish in that way to sending it to London themselves and waiting for the return of the money. Fish was sent from London every morning as far as to Norwich, although Yarmouth is only eighteen miles distant. The fish owners of that place will not serve the Norwich dealers with one kind of fish without they take other kinds as well, and therefore they send the whole of their fish to London, and the fishmongers in the country have their supply from Billingsgate daily.

Proceedings of Institutions.

Carlisle Mechanics' Institute.—In the report on the close of the forty-third year, the committee, while regretting that they have no great progress to relate, are glad to record that no serious retrogression has taken place. The library now contains between five and six thousand volumes, and during the past year 23 new volumes have been added. Respecting the issue, there is a decrease of 1,710 as compared with last year, when the number issued was 8,698, against 6,988 during this. During the year now closed, two classes were commenced, at the usual time, one for Latin and French, by Mr. Morrison, and the other for mathematics, book-keeping, and other English subjects, by Mr. Rotherham. By a melancholy accident the committee were deprived of the services of the former teacher at the beginning of 1867, and it was thought unadvisable to appoint a successor for the remainder of the session. Three lectures have been given during the year, two by the president, and one by Mr. M. D. Conway on America. The number of full members and annual subscribers is 304, and of reading members 123, making a total of 427. The financial statement shows that the receipts have been £174 5s. 11d., and that there is a balance in hand of £10 5s. 10d.

Chippenham Literary and Scientific Institution.—The report for last year congratulates the members on the continued success and usefulness of the Institution; the number of members at present is 63, viz., 21 at an annual subscription of £1, and 42 at 10s. The Institution has been favoured with lectures from R. N. Fowler, Esq., on "Mahomet and his Religion;" T. W. Saunders, Esq., Recorder of Bath, on "Criminal Jurisprudence in England;" and the Rev. Canon Jackson, on "Notices of Ancient Chippenham." The library, which has been increased during the past year by the addition of 40 volumes, includes many standard works, and now numbers nearly 800 volumes. The finance account shows that the receipts amounted to £59 12s. 4d., and that there is a balance in the hands of the treasurer of £7 6s. 2d.

EXAMINATION PAPERS, 1867.

The following are the Examination papers set in the various subjects at the Final Examination held in April last:—

ARITHMETIC.

THREE HOURS ALLOWED.

1. A man spends £42 every 28 days, and lays by £50 a year. What is his yearly income?

2. A bankrupt owes £5,920, and his effects realise £3,700; how much can he pay per pound; and how much does he owe to a creditor who receives £401 3s. 11½d.

3. If an engine of 12-horse power pump up 3,200 gallons of water in an hour and a-half from a pit 150 fathoms

deep, how long would the same engine take to raise 2,000 gallons from the mean depth of 100 fathoms?

4. Find by Practice the value of 573⅝ ounces of gold at the rate of £3 17s. 9d. per oz.

5. Required the amount of 91 cwt. 3 qrs. 13 lbs. of hops at £9 13s. 7d. per cwt.

6. The knot, or nautical mile, is $\frac{1}{60}$ of a degree of latitude, which is equal to 69½ statute miles. By what fraction of a statute mile does the knot exceed that mile?

7. Out of 11 guineas ⅔ are paid to A and ⅛ to B, after this ⅔ of the remainder are paid to A and the rest to B. What sums did each receive?

8. A cistern can be filled by one pipe in 20 minutes, by another in 30 minutes; a third pipe can empty it in 12 minutes. Suppose the cistern to be half full, and the three pipes set open at once, in what time will it be full?

9. If ⅔ of ⅗ of a yard cost $\frac{3}{10}$ of a crown, how many francs ought I to pay for 3 yards, the franc being reckoned at 10d.?

10. A ship, with a crew of 48 men, and provisions for 40 days, is becalmed; the captain reduces the daily allowance from 2 lbs. to 1½ lb., and sends away, by a passing steamer, a portion of his men, by which he was enabled to hold out for 45 days. How many men were sent away?

11. How many men will be required to dig a trench 64⅘ yards long, 10⅗ feet wide, and 2½ feet deep, in 2⅗ days of 9½ hours each, when it took 9 men 2⅜ days of 10 hours each to dig a trench 81 yards long, 12½ feet wide, and 1⅓ feet deep?

12. What number of works, each consisting of 2 vols., and each volume 2·47 inches thick, would fill 4 shelves, when 19 works, each 3 vols., and each volume 1·3 inch thick, fill 10 such shelves?

13. What is the difference, in the present currency, between £2 7s. 9¾d. and £2 7 florins, 9 cents., 3 mils?

14. At what rate per cent. per annum, simple interest, will £350 amount to £399 in 4 years?

15. In what time will £2,750 gain £412 10s. at 5 per cent. per annum?

16. What is the difference between the banker's discount and the true discount of £517 10s. for 7 months at 6 per cent. per annum?

17. If the 3 per cent. Consols be at 90, what should be the price of a £50 railway share paying 4 per cent., that the two investments may be equally advantageous?

18. Bought cinnamon at 7s. per pound, and sold half of it at 6d. an ounce. At what price per ounce may I sell the other half, that the gain on the whole may be 10 per cent.?

19. I have paid to day £2,180, being repayment, with interest, of two loans, both contracted at the same time, viz., £1,163, borrowed at 4 per cent. per annum, and £994 at 4½ per cent. per annum. How long is it since the sums were borrowed?

20. I bought a horse for 25 guineas cash, and sold him the same day for 30 guineas, with such allowance of credit as made my immediate gain 17 $\frac{3}{11}$ per cent. What term of credit did I allow?

BOOK-KEEPING BY DOUBLE ENTRY.

THREE HOURS ALLOWED.

1. Journalize and post, in proper technical form and language, the following imaginary transactions, and make out from the ledger a trial balance, a profit and loss account, and a balance-sheet.

On 1st January, 1867, John Ward and W. Campbell have assets and liabilities as follows, viz.:—

Assets.	£	s.	d.
Business premises and plant, valued at	1,500	0	0
Sherry	3,525	0	0
Brandy	500	0	0
Due by J. Smith	100	0	0
Bills receivable	200	0	0
Cash	1,115	0	0
Liabilities.			
Bills payable	750	0	0
Due to P. Robb	208	0	0
John Ward's capital is	3,908	0	0
W. Campbell's „	2,074	0	0

They take J. Smart into partnership on the 1st January, 1867. J. Smart's capital amounts to £2,500 in cash.

N.B.—The capital and drawings of the partners are subject to interest at 5 per cent. per annum, and the net balance of profit and loss is divisible thus—to John Ward, one-half; to W. Campbell and J. Smart one-quarter each.

1867.		£	s.	d.
Jan. 1.	Advanced for petty cash	20	0	0
	Sold J. Smith, brandy	15	0	0
„ 2.	Paid cash for our acceptance of J. Duncan's draft, due this day ...	200	0	0
Jan. 5.	Discounted J. Green's acceptance for £200, and received £198 in cash and allowed for discount £2	200	0	0
	Bought of J. Smith, sherry	715	0	0
	Accepted J. Smith's draft, at two months' date	600	0	0
„ 8.	Invoice of brandy bought of S. Nokes	1,035	0	0
„ 9.	Received consignment of claret from T. Sandford, to be sold by us on his account, at 2 per cent. commission on proceeds, invoiced at	300	0	0
	Paid cash for carriage of above consignment	2	0	0
„ 10.	Advanced cash to T. Sandford ...	100	0	0
	Paid cash for additional business premises	500	0	0
„ 12.	Cash paid S. Nokes for brandy ...	1,015	0	0
	Discount allowed by S. Nokes ...	20	0	0
	Sold W. Brown, brandy	50	0	0
	Sold W. Brown, sherry	500	0	0
	Received W. Brown's acceptance, at 21 days	550	0	0
„ 15.	Cash drawn out by W. Campbell	100	0	0
„ 20.	Consigned to R. Green, to be sold by him on our account and risk, sherry, invoiced at	200	0	0
„ 27.	Lent cash to J. Smith	100	0	0
„ 29.	Bought sherry of P. Robb	632	10	0
	Paid P. Robb on account, by handing to him W. Brown's acceptance for £550	550	0	0
„ 30.	Sold brandy for cash	500	0	0
	Sold sherry for cash	850	0	0
„ 31.	Sold for cash part of consignment of claret from T. Sandford	150	0	0
	Paid salaries of clerks	45	0	0
	Trade charges, paid out of petty cash	19	4	0
	Interest on amount drawn out by W. Campbell	0	4	2
	Interest on J. Ward's capital.....	16	5	8
	„ W. Campbell's capital	8	12	10
	„ J. Smart's capital	10	8	4
	Estimated wear and tear of business premises and plant	10	0	0
	Commission earned on consignment of claret	3	0	0
	Stock of sherry on hand	3,473	0	0
	„ brandy „	960	0	0

2. What is book-keeping by double entry as distinguished from single entry?

3. Describe what is the import respectively of the terms *personal*, *real*, and *nominal*, as applied to accounts.

4. How is the account of profit and loss affected if, on

closing the books, (*a*) the value of the stock of goods on hand is over-estimated; (*b*) if a known bad debt is reckoned as a good one?

5. If, on examining the books, it be found that the following entry, viz., "Accepted John Smith's draft, at two months, £100," has been journalized and posted as if it had been "Received John Smith's acceptance, at two months, £100," what journal entry or entries would be necessary to correct the error?

ALGEBRA.

THREE HOURS ALLOWED.

1. Reduce to their simplest forms—

$$\frac{\dfrac{x}{x-y}+\dfrac{y}{x+y}}{\dfrac{x}{x-y}-\dfrac{y}{y+y}} \qquad \frac{\sqrt{a+b}+\sqrt{a-b}}{\sqrt{a+b}-\sqrt{a-b}}-\frac{\sqrt{a+b}-\sqrt{a-b}}{\sqrt{a+b}+\sqrt{a-b}}$$

2. Solve the equations $x^3+x^2-x-1=0$.

$$\left.\begin{aligned} x^2-xy &= 70 \\ xy-y^2 &= 21 \end{aligned}\right\}$$

3. Extract the square roots of the binomial surds.

$$43-30\sqrt{2}; \quad \sqrt{20}-\sqrt{15}$$

4. There are 10 flags; 1 white, 2 red, 3 blue, 4 yellow; and signals are made by employing them all at the same time one over the other. How many signals can be thus formed.

5. The first and seventh term of a geometrical series being 30 and 1,920, find the sum of 13 terms of the same.

6. A requisition for 87,500lbs. of bread was levied upon a certain number of villages in equal portions; subsequently two of them fell into the power of the enemy, and the whole amount had to be contributed by the remaining ones, who, in consequence, each contributed 5,000lbs. more than under the original terms of the levy. How many villages were there?

7. The interest on a certain sum of money is £225, and the discount on the same for the same time £187 10s. What is the sum?

8. Find the value of $(x-c)^2(x+2c)$; and hence determine the relation that must subsist between q and r, in order that the equation $x^3+qx+r=0$, may have two equal roots.

9. Prove that the sum of the series,

$$1+n^2+\left(n\frac{n-1}{2}\right)^2+\left(n\frac{n-1}{2}\frac{n-2}{3}\right)^2+\text{ etc.},$$

is equal to the coefficient of x^n in the expansion of $(1+x)^{2n}$ and show that this latter is $\dfrac{1\cdot 2\cdot 3\ \ldots\ldots\ 2n}{(1\cdot 2\cdot 3\ldots n)^2}$

10. A race is to come off between two boats, in each of which three rowers are to be placed, chosen by lot out of six men, whose relative powers of propulsion are represented by the numbers 7, 8, 9, 10, 11, 12. Find the chance that one at least of the two middle men will be among the winners in the race.

11. If $x^3+y^3+z^3=m\,xyz$, and $x^6+y^6+z^6-x^3y^3-y^3z^3-z^3x^3=0$, show that there are eighteen systems of ratios, $x:y:z$, which satisfy the above equations and obtain their values.

(To be continued.)

FINAL EXAMINATIONS, 1867.

The following additional certificates have been awarded:—

119—Houston, Alexander, aged 18, Belfast Academy, teacher—Arith. (1st); Alg. (1st); Geom. (2d).

121—McNeill, Henry, aged 17, Belfast Academy, teacher—Arith. (1st); Alg. (1st); Geom. (2d).

PARIS EXHIBITION.—AWARD OF PRIZES.

The list of prizes which appeared in the *Journal* last week was translated from the proof-sheet of the list compiled by the Imperial Commission, who have now issued a revised list, which has many important variations. Even this is not to be wholly relied upon, and it is undergoing revision. As soon as possible a complete list will be printed. The following corrections, especially referring to the list of the grand prizes, may, however, be made. The number of grand prizes awarded to the United Kingdom is nine, namely:—

Group 1.—Class 4 (Architectural Designs)—Mr. Waterhouse, of Manchester.

Group 5.—Class 43—British India (cotton).
Class 40—Bessemer (production of steel).

Group 6.—Class 51—Mr. C. W. Siemens, London (regenerative gas furnace).
Class 54—Whitworth Company, Manchester (machine tools).
Class 64—Atlantic Telegraph Company.
Class 66—The Life-boat Society (for organization and material for saving life).

Messrs. Napier, Glasgow; and Messrs. Penn, Greenwich.

Messrs. Siemens Brothers were classed by the jury for a grand prize in Class 64, Telegraph Apparatus, and the Lords of the Admiralty for a series of models of the internal arrangements of ships of war, but the former were *hors concours* on account of one of the members of the firm being a juror, and the Admiralty declined to compete for rewards.

Parties of working men continue to arrive from all parts of Europe to visit and study the Exhibition; 250 Danes reached Paris at the end of last week, under the guidance of M. Walfhagen, vice-president of the Danish Commission. A special vessel was chartered to convey the party to France, and the visitors are lodged in the Pavillion de Sully, at the cost of a Commission specially formed to assist workmen visitors; they are to stay in Paris nearly a fortnight. The next party expected is from Turin, and will consist of workmen and manufacturers, sent at the cost of the province of Turin. Before leaving home, they were received by the Prefect of Turin, who wished them a pleasant journey, and gave them some counsel as to studying the Exhibition in such a manner as to make their visit profitable to the town and province of Turin. A considerable number of Belgian workmen are expected in Paris in the month of August; this visit is the result of the efforts of M. Dupré, the Belgian Commissioner, acting in concert with the Commission above referred to. In this case, and probably, also, in those already cited, the workmen will be brought over without cost to themselves.

The aquatic competitions commenced on the 7th, and were to be continued until the 12th instant. Five cutters have arrived from England, including that of Oxford University, and one from Canada.

WORKS IN BRONZED CAST-IRON.

The American Department of the Paris Exposition contains a numerous collection of lamps of various kinds, clock-cases, and other works, all of them executed in bronzed iron, which have attracted the attention of all visitors. They are the productions of Tucker's Manufacturing Company, established in the City of Boston, and they are the results of experiments that have been carried on by Mr. Tucker during the last seventeen years.

The material employed is American iron of several

varieties compounded together, with a comparatively small admixture of the Scottish Coultness iron. A combination of several important qualities is thus obtained, and a material is produced possessing smoothness in working, softness, and also a sufficient degree of strength. The castings, having been executed in green sand, undergo the customary process of pickling in dilute sulphuric acid, after which they are finished on their salient points either with the lathe or the emery-wheel, as may appear to be most expedient for the polishing; the beautiful granulated velvet-like surface of the mat or field, however, upon which the polished portions of every design appear to rest, is produced by the action of the acid only, and without the application of any kind of tool. The bronzing—the final stage of the manufacture—is accomplished by the means about to be described, imparting to the metal a colour that becomes part of itself.

The iron, covered with a film of vegetable oil, is exposed to heat of a high temperature (the degree of the temperature and the duration of the exposure having been determined by experiment), and thus the desired colour is obtained, through the union of the carbonised oil with the oxydised metal. This, accordingly, is a *permanent* bronzing, since it is actually incorporated with the substance of the metal; and, consequently, the works thus produced are not liable to injury from the action of the atmosphere, from the touch of the hand, from changes of temperature, from excessive damp, or from various other casualties to which they may be exposed. In some degree the bronze surface produced on the cast-iron by this process appears to resemble that of certain steel pens, which have a bronze-like aspect; but there exists no real resemblance between these two classes of productions, since, in the case of the steel pens, a superficial varnish (which may be removed by the application of alcohol) is added to the oxydised metal, and deposited upon it, but not incorporated with it.

The designs for the lamps, clock-cases, and other works exhibited by Mr. Tucker at Paris have been furnished in every instance by Mr. Francis Fracker.

This Tucker bronzing process, which is patented in England and France as well as America, may be applied to the decoration of stoves, iron bedsteads, and many other works in iron, which at present are usually coated with lacquer or varnish.

Specimens of the Tucker collection exhibited at Paris have been secured for the South Kensington Museum.

PRODUCTION AND CONSUMPTION OF EGGS.

A writer in the *Grocer* says:—

We know of no article of consumption in the import accounts of the Board of Trade, upon which we can place our finger, that will show a greater or more continuous increase than the simple unit of the egg. Unimportant as it might have appeared some years ago, it has gone on from thousands to hundreds of thousands, and then to millions, until the quantity seems incredible, and could only be realised in extent by the measurement of tons weight. All this represents so much food required by the necessities of one portion of the population, or the luxuries of another; for the frugal and solitary breakfast of the man of letters, or to mix on the table with the more numerous viands of the social family party; or to be called into sudden requisition in aid of the housewife when the casual visitor steps in. These are the ostensible signs of consumption, but the egg appears everywhere, and yields to every turn of the culinary art—in pastry of all kinds, in confectionery, in the making of ices, sometimes in medicine; and when in a state unfit for the table it refines our sugar, or softens the leather that preserves whiteness to the delicate hands of the fair sex. All descriptions are eatable and nourishing, but it is only the egg of the domestic fowl that enters into general use. In some of the villages along the rocky portion of our coast, the season when the sea-gulls hover in swarms about the ledges of the rocks, is for them a time of plenty; and there is a danger and romance about the mode of their collection quite unknown to, or ever dreamed of, by the farmyard peasant or the servant of the commercial incubating establishments. Our home producers, as a class, are probably not much given to the study of figures, or they might be struck with the vastness of the importations, of a demand that never relaxes, and a supply from abroad that continually increases—so much, indeed, that our egg merchants look upon the home source as a mere trifle in the scale in satisfying the wants of their customers. We have no accounts of the numbers brought to the markets of Leadenhall and Newgate, and only the rough estimate of a French authority, who gives the value of the poultry of the United Kingdom at less than one year's supply of eggs from abroad. Thus the annual import of eggs from the Continent averaged 73,000,000 from 1843 to 1847; it averaged 103,000,000 during the next five years, 147,000,000 for the next five years, and 163,000,000 for the next five years. In 1861 we received from abroad 203,313,360; in 1864, 335,298,240; and, in 1866, 438,878,880, being in excess of one million a day, and valued at £1,097,197 sterling. These are facts that might well astonish the agricultural mind. The Royal Agricultural Society is evidently alive to their importance, for at the meeting for the Eastern Counties, to be held at Bury St. Edmunds in the present month, the farmyard poultry was to form a prominent department. Prizes are offered for the best description of fowls, varying from £5 downwards. No similar inducements have been given by the Society since their show at Chester in the year 1858.

At the present time, although there is much attention devoted to the subject, it is principally confined to the fanciers, and upon the best description of birds, so that poultry, and their product, the egg, have not gained any general popularity amongst persons engaged in agriculture. Whether this arises from a disbelief in the profitableness of the occupation, or the difference between the tenure of the soil in England and that of France, from whence we derive our great supply, is a matter beyond our purpose to attempt any elucidation. We merely wish to place the facts before our readers, who are necessarily more interested in the sale than the production of articles. That much may be learned, both from the study of these facts and the mode in which the eggs are produced in France, we readily admit; and if the ventilation of this topic will aid in the increased supplies from at home, we shall have effected some good beyond the general readers of this journal. It is evident that more than one million sterling in value of eggs were landed on our shores that could have been raised with the greatest ease at home; and the question naturally arises, "How do foreigners thus take possession of our own markets, with all the disadvantage of having to convey a perishable cargo through the hands of shippers and commission agents, with all the risks and attendant expenses?" There has been no want of inducement in the matter of prices, as in the year 1854 the Custom-house computed the real value of eggs as low as 4s. 6d. per ten dozen; but during the last six years 6s. per 120 has been reckoned, which is also the wholesale price in France. Amongst the arrangements under the French treaty was the abolition of the duty charged on eggs. On August 8, 1854, there was a reduction to 4d. per 120, and from that time to March 6, 1860, they were entered by the cubic foot at the rate of 8d. This mode was found less convenient, and the previous system was adopted—that of number, called great hundreds, or 120, as a unit; and eggs were placed amongst free articles.

The countries from which we derive our principal supplies will be seen by the following table, with the exception of the year 1866, where the total alone has yet been ascertained:—

From	1862.	1863.	1864.	1865.	1866.
	gt. hunds.	gt. hunds.	gt. hunds.	gt. hunds.	gt. hunds.
Hamburg	6,864	3,066	3,813	5,670	...
Bremen	15,433	10,250	3,413	1,881	...
Holland	3,801	1,363	1,206	1,772	...
Belgium	169,462	158,526	217,067	171,855	...
France	1,501,402	1,872,753	2,393,521	2,795,899	...
Portugal	13,813	4,251	6,232	1,712	...
Spain	139,628	78,828	54,465	31,328	...
Channel Islands...	85,226	94,487	113,294	21,617	...
Other countries...	381	900	1,141	1,710	...
Total	1,936,010	2,224,414	2,794,152	3,033,444	3,657,324
Value.....	£593,813	£673,638	£835,028	£928,247	£1097,197

In the volume of trade and navigation published by the Board of Trade, the average prices given for the computed value in the year 1865 were—Belgian 6s. 2d., French 5s. 11d., the Channel Islands (their own produce) 5s. 10d., and Spanish 6s. 3d. per great hundred. It would, however, be an erroneous impression to suppose that Belgian eggs were therefore worth more than French, the mode adopted by the authorities at the Custom-house being this: to take the average prices published in the *Economist* for that year as follows, per 120:—

	s.	d.		s.	d.
January	7	6	July	5	9
February	7	4½	August	5	7
March...	5	9	September...	5	6¾
April	5	7½	October	6	9¾
May	5	4½	November	7	8½
June	5	3	December	8	7

and apply the same price to the imports of each month from all parts. The average price so applied varies from month to month, as will appear from the above quotations. Since the value attached to the importations for the entire year is the sum of the values of each month, it follows that the average value of the importations for the year varies for the several countries according to the month or months in which the bulk of those importations took place. The cargoes are shipped chiefly in steam vessels, and arrive at the ports of Southampton, London, Folkestone, Arundel, Newhaven, and Shoreham. Of the supplies from Ireland, in the absence of any positive data, it is generally supposed that they have diminished from that quarter.

The time for laying eggs takes place according to the temperature and the climate. They begin in France, and in most parts of Europe, from January to March, the forward hens laying in the earlier months, and the sluggish not until the latter. For purposes of preservation the late eggs are considered the best. April, May, and June are the months when the production is most abundant; but in July the laying slackens, to resume a certain degree of fresh activity in August and September. In October and November, which is the season of the moult, it ceases almost wholly, and is null in the month of December. To obtain eggs in this season artificial means are employed by raising the temperature of the houses, and some poulterers assert that a supply can be had in the winter by feeding the birds on buckwheat, which is then given whole, and upon meat. In parts of France where breeding is carried on as a trade, there is a separate class of persons called *couveurs*, or hatchers. The hen is seldom allowed to lead the chickens after being hatched; the *couveurs* entrust this office either to capons or turkeys, the hen being more valuable for laying eggs than rearing the brood. If a similar attention to the details were giving in this country, the stock of fowls which roam about the farmyard, and gather corn from the threshing, instead of being a mere adjunct and perquisite of the servants, would return sufficient to discharge the rental of many a small occupation. Such, we have understood, has been the case where the experiment has been fairly tried, and once this becomes an established notion our home supplies will increase in a greater ratio than they do at present. According to a competent authority, at this time, what with improved native and imported varieties, we possess the best stock of egg-layers, hatchers, and table fowls in the world. In no country is the management of our best poultry-yards excelled. These should serve as a model for the rest; and, to bring up the wholesale results to their true national importance, all we require is an extension of the taste for bird-farming amongst those who earn their living on the land.

To show the seasons in which the laying is most active, and the variations that take place, we give the following figures from our import tables:—

	1867.	1865.	1866.
	Number.	Number.	Number.
January	6,999,000	13,301,000	16,386,000
February	17,851,000	22,323,000	25,794,000
March...	31,849,000	32,231,000	46,537,000
April	42,650,000	39,966,000	51,471,000
May	39,930,000	49,507,000	56,767,000
June	33,177,000	37,890,000	52,334,000
July	35,332,000	38,488,000	36,476,000
August	34,549,000	34,279,000	40.566,000
September...	29,711,000	28,444,000	33,916,000
October	19,547,000	24,056,000	26,917,000
November...	15,864,000	20,424,000	20,696,000
December	27,836,000	23,103,000	31,018,000

In connexion with this subject, we paid a visit to the National Poultry Company's establishment, which is within a short walk of the Bickley Station, on the South-Eastern Railway. This experiment in the production of poultry is the most important that has been made, and another is projected at Kattern Bourn, Shenley, Herts, about fourteen miles from London. The plans for the houses at Bromley were made by Mr. Geyelin, but were not carried out to their original extent. The home, now under the management of Mr. Massey, consists of a principal building, sheds, houses, yards, &c., and market gardens occupying six acres of dry, gravelly soil. The main building is a greenhouse-looking erection, of wood and glass, 340 feet long, 20 feet broad, and 12 feet high to the central ridge. The pens are arranged along each side of the long central passage, which has a floor of red tiling, with shafts admitting cold air in summer and warm air in chill weather, ventilation being provided from above. The pens are in two tiers—that is, a ground-floor and a story, each occupying twelve feet of frontage, with a breadth of three feet from the wired front to a wall of boards, and outside the boards is a similar range of pens of the same size, having for their outside wall a framework of wood and wire. Thus, a cock and six hens have the range of an inner pen of 12 feet by 3 feet, completely shut in from the weather, and also of an outer pen of equal size, roofed, but exposed to the open air through wire of about two-inch mesh. This was thought to be rather close confinement for all but the most inactive breed of fowls, and therefore there have been lately added to the building open runs, each of about 30 feet square, in which the different pens of birds are permitted to exercise and scratch in turn. When a hen wants to lay she creeps into a box placed outside her pen in the central passage, and her nest consists of a circular earthenware pan, 12 inches in diameter and 5 inches deep, containing some dry sandy earth. Scrupulous attention, of course, is paid to lime-whiting and to every detail of cleanliness in the pens and the vessels.

At one end of this building, which accommodates the brood stock, are the departments for fattening and hatching, and the apparatus for artificial incubation; the department for rabbits, the duck-houses and tanks, the boiling-houses, pigstyes, &c., occupy other portions of the premises. There were about a thousand head of poultry on the premises; all looked healthy, and, being the season for laying, the attendants were collecting the eggs into baskets. These, we believe, are sold to some

of the hotels in town, but a great many are disposed of for the purpose of hatching, and are marked in pencil according to the different breeds. At present the Bromley Home is chiefly devoted to the breeding of what may be called "fancy" birds, and since the stocks are excellent, the diffusion of the best class of birds throughout the country will produce national benefits superior to the sale of mere quantities of eggs. The French varieties of Houdan, La Flèche, and Crevecœur, are said to bear confinement, are hardy, good layers, and non-sitters, and they vary in prices from 15s. to 60s. each bird, and for eggs, per sitting of 13, from 15s. to 18s. If we might venture to offer a word of friendly advice to this and similar establishments, in which we take the liveliest interest, it would be to reduce the price of eggs. Those disposed of for domestic use are, we believe, rendered unfit for the purpose of sitting, and high prices act as a prohibition upon all such experiments. Although opinions amongst poulterers differ respecting the use of natural means for hatching, yet for the bad sitters the invention of the incubator may prove useful. Mr. Crook, who is a fancier, has by his firm in Carnaby-street, Regent-street, patented a very successful invention, to which we shall hereafter allude. In such undertakings as the Bromley Home we possess the source of supply. The arrangements for feeding, hatching, and fattening are open to visitors, and are interesting even to casual observers; for farmers, and others commercially affected, they should furnish examples for the proper and successful management of their own poultry-yards.

The increasing demand for eggs, although it has failed to elicit any corresponding or commensurate efforts in our own country, has not been lost upon our quick-witted and versatile neighbours across the Channel. The metropolis is almost wholly supplied from foreign sources, and new-laid eggs, as they are called, demand exorbitant prices, and only reach the tables of the well-to-do classes. Those who have the good fortune to accept the hospitalities of the farmhouse, in addition to the never-failing appetite on such occasions, will discover the superiority in this portion of the fare, and will gladly return with a contribution from the henhouse. The provincial towns, with trifling exceptions, monopolise the eggs from the surrounding neighbourhoods; the small farmers who do not sit the market sell their supply to the country shopkeepers, or give them in exchange for other articles. Many cottagers contrive to keep a few fowls, and where there is no pig these act as scavengers, consuming the scraps of the family, the outside cabbage-leaves, peelings off boiled potatoes, &c., and if supplied with a little corn, lay a great many eggs. There are no regular agents or dealers engaged in the trade, but the grocer or the butcher of the village takes the surplus at the usual market price, deducting his commission. The consumption of an ordinary household in the country is as much as 2,000 eggs per annum, so that the residue has no great effect upon the metropolis, or the large manufacturing towns. Indeed, it is but too probable that the care of poultry has retrograded; for as the small holdings have been absorbed by large farms, many an active, frugal housewife has been withdrawn from rural life who had the will and the means of supplying the market. Neither the cottager with his allotment (instead of his share in the village green or common) nor the artizan has range enough for producing eggs to advantage; therefore, in catering for the public, the wholesale merchant must occasionally pay a personal visit to the markets in France, and rely upon the foresight and activity of agents to meet the wants of his trade.

Many have entertained a belief in the existence of gigantic establishments, which, from assertions made in the public papers, and the largeness of the imports, found ready credence; but we believe that throughout France there are none more extensive than our own at Bromley. The egg business is almost exclusively confined to small farmers, by whom it is carried on in a vigorous and commercial manner, more especially in the provinces of Burgundy, Normandy, and Picardy. According to the latest agricultural returns furnished by the French Government, for 43 departments, the value of eggs and feathers produced each year was taken at 32,500,000 francs. This was considered to be much under the mark, as the consumption of Paris alone is equivalent to 12,000,000 francs; and although, per head, it would be less in the provinces than at Paris, it may be fairly set at rather more than half as great. The eggs, which at Paris are worth 60 francs per 1,000, average 40 francs per 1,000 in the country. We thus obtain a total of 100,000,000 francs, or, with the export, 142,000,000 francs (£5,680,000), as the annual value of French eggs. At this rate the consumption amounts to 2s. per head of the whole population. One of the French writers on this subject gives 7,000,000 eggs as the annual produce; and if we average 60 eggs as the number that each hen would lay, there would be at least 117,000,000 fowls, and these, at 3 francs apiece, would give £14,625,000 sterling as the value of the poultry stock of France. For the past year, on the same ratio of 60 per head, the eggs imported into this country represent the laying of no less than 7,300,000 eggs.

From a pamphlet published by M. de la Fosse at Goussainville, near Houdan, we select a few statistics of the trade in that immediate neighbourhood, which will give a correct idea of its importance. At the markets of Houdan, Dreux, and Nogent le Roi, there are sold annually upwards of 6,000,000 head of fat poultry, viz.:—

	Per Week.	Per Month.	Per Year.
Houdan	40,000	160,000	1,920,000
Dreux	50,000	200,000	2,400,000
Nogent le Roi	35,000	140,000	1,680,000
Total	...	...	6,000,000

This does not include the sale of chickens, poultry, and eggs, which forms a separate trade. Every village, says an eye-witness, has its weekly markets, where farmers and their wives bring their produce for sale, in preference to selling at the farmyard. The police regulations in the markets are strictly enforced. The various products are classified before the market begins. Each person is bound to keep his assigned place, and not allowed even to uncover his goods, much less to sell, before the bell rings, under the fine of 5 francs. At the ringing of the bell, the bustle to uncover, the rush of buyers, and the chattering, are worth while to witness. The dealers and merchants take up their stand outside the market, where they send all the products they purchase. The seller has a ticket given him, with the purchase price on it, and is paid on delivery of the goods at the dealer's stand. It seems almost incredible that even in some village markets, within two hours, such a vast amount of business can be transacted, with the greatest order and decorum. Some merchants will purchase from 2,000 to 3,000 pounds of butter; others 20,000 to 30,000 eggs, or 1,000 heads of poultry, &c., all which are taken to their warehouse to be sorted, packed, and perhaps forwarded the same day to London or Paris. The current price for every commodity is fixed and known immediately after the market opens, and depends entirely on the demand and supply. At the wholesale poultry market, La Vallée, in Paris, where the poultry, dead or alive, is forwarded from all parts of France, there are a number of licensed agents, who sell by auction to the highest bidder; this market is a curious scene from four till nine in the morning, when thousands of crates of all descriptions of poultry are cleared out and disposed of.

The eggs are sold in the markets of Paris in baskets, which ought to contain 1,040 good valuable eggs. These are counted, at the wish of the buyer, by the official agent, who verifies the *déchet*, or loss; also the size, by passing them through a ring. For such there are charges from

25 cents per *mil* for counting, 60 cents per *mil* for examination, and 15 cents for passing the ring; besides these charges there are the duties collected by the Municipality of Paris. The production of eggs in France is, to a certain point, unlimited; and the attention of breeders has been drawn to the improvement of the breed by foreign additions, and modes of preservation also for long voyages. In consequence of the success which had attended the exhibition of the poultry of La Bresse (in Burgundy), a stir was created, and on the representations made to him, the Minister of Agriculture instituted a special show for fat poultry at Paris. The fowls were distributed into five classes—La Bresse, Houdan, La Flêche, Normandy, and all other breeds. La Bresse kept the lead, gaining, after a struggle with La Flêche, the gold medal for the best fowls of any class. Much of this success was due to the strenuous exertions of Count Le Hon, as no region had greater difficulties to surmount than La Bresse, which constitutes the arrondissement of Bourg, in the department of Ain, and extends from the banks of the Saône eastward to the spurs of the Jura. The fowls have certain features to distinguish them, and the hen begins to lay in February, and for a month or six weeks lays daily, then three or four times a week, till she has laid about 160 eggs, besides rearing two or three broods. On every farm poultry is fatted to a certain extent, and until lately was little known or appreciated at Paris, though for 40 years it has been exported to St. Petersburg.

The prices of eggs per 1,000 have been at different periods as follows in the Paris market:—

	fr.		fr.
1804	48	1850	43·79
1826	64·50	1852	45·32
1845	48·74	1853	50·19
1846	50·27	2866	60

And the consumption had risen from 74,000,000 in 1807, to 174,000,000 in 1853. These are collected from ten or twelve departments which encircle the city, but more than half is furnished by Le Calvados, L'Orne, and the Somme. From the latter and the Pas de Calais are derived the English supplies. Around Houdan are the villages of Goussainville, de St. Lubin, and La Haye. Near La Flêche au Mans are Villaine and Boce; also some hamlets near St. Pierre Dive, Lisieux, Calvados, and Beauvais in the Somme—all localities abounding in poultry. The ports at which the greatest amount of activity takes place are Calais, Cherbourg, and Honfleur; at Calais the eggs are packed in cases with straw, 1,100 to the case; and at Cherbourg and Honfleur in cases of 600 and 1,200.

The total value of exported eggs, of which England received the lion's share, has been as follows:—

		fr.
1815 to 1835, an average of	..	2,786,000
For 1850	..	7,512,000
„ 1858	..	10,418,000
„ 1859	..	11,340,000
„ 1861	..	17,845,000
„ 1864	..	27,974,000
„ 1865	..	37,650,000
„ 1866	..	42,334,000

How these exports have been distributed will appear by this table:—

	1864.	1865.	1866.
	kilog.	kilog.	kilog.
Belgium	46,364	84,107	130,627
United Kingdom	22,095,262	29,765,361	33,458,539
Germany	15,767	35,713	
Spain	34,789	52,632	
Italy	14,799	16,117	278,659
Switzerland	143,200	133,753	
United States	2,156	3,370	
Other countries	27,120	29,719	
Total	22,379,457	30,120,772	33,867,825

As a general definition, the districts that grow buckwheat produce the greatest abundance of eggs; and if we would prosecute this matter successfully at home, it would be well to ascertain whether buckwheat cannot be imported to any considerable extent at a cheap rate. Upon the quality and description of food egg-laying much depends.

From a review of these facts, it will be apparent how much our neighbours, the French, have accomplished; an export of one million sterling per annum in eggs is no insignificant item even in the balance-sheet of a nation. We have entered upon this subject of foreign supply as fully as the public returns and the sources of information, private and otherwise, would enable us, since we have felt its importance to our readers, especially as retailers, and also its indirect bearing upon producers. Many of the former must visit the capital city of France during the unusual attractions of this year, and they may be induced to diverge from the ordinary route. By a personal knowledge of the egg districts named, they will learn, better than by any descriptions we can give, how our admirable and talented rivals in commerce have acquired superiority in this department of business, and exemplified the saying of the great artist, and whilst imparting which maxim he probably gave to his pupils the secret to his own fame, "that by attention to trifles it is possible to arrive at perfection."

Fine Arts.

Rembrandt Etchings and Drawings.—A large and choice collection of these works is now on view at the Burlington Fine Arts Club, Piccadilly. Among other valuable etchings may be seen that of "Christ Healing the Sick," commonly known as "The Hundred Guilder." Of the five copies exhibited of this masterpiece by Rembrandt, displaying different stages in the plate, the greatest interest naturally attaches to that which in the recent sale of Sir Charles Price's collection fetched the unprecedented sum of £1,150. This work, which can be traced in an unbroken pedigree from Rembrandt himself, is lent by its present possessor, Mr. C. J. Palmer. The student of the great master of the art of etching will find examples of each distinctive class, such as landscape, portrait, sacred history, &c. The collection also contains some rare Rembrandt drawings. Among the well-known collectors represented may be mentioned Holford, Felix Slade, Seymour Haden, Fisher, Morrison, Palmer, Baron Marochetti, the Duc d'Aumale, &c.

National Portrait Exhibition.—Photographs have been taken of these portraits, in illustration of the official catalogue. The catalogue contains biographical and historical notices, together with an introduction by Mr. Samuel Redgrave to the exhibition and the art of portrait painting generally. About eight hundred photographs have been taken, with the consent of the owners, out of a collection numbering 866 works. The entire series has been distributed in eight volumes, and the cost of the whole, bound in half morocco, is £50. Any person, however, may select for himself a volume of 100 portraits for six guineas, or a packet of sixteen for one guinea. A single photograph can be purchased for 1s. 6d. Specimens may be seen in the exhibition, or at the office of the Arundel Society, Old Bond-street.

Manufactures.

Alkali Works.—The Government Inspector, appointed under the provisions of the Alkali Act, has just presented his report for 1866, from which it appears that a further advance has been made in the manner of preventing the escape of muriatic acid during the processes of manufacture of various salts, the amount of

escape last year being 0·73, against 0·88 of the preceding year. This improvement, small though it be in apparent amount, is a real benefit to the residents in the neighbourhood of chemical manufactures, as the difference of 0·15 represents more than 15 cwt. of muriatic acid per diem, or 4½ tons per week. The condensation of the dangerous acid is thus shown to be generally satisfactory, although some allowance must be still made for leakage, which it is difficult to estimate, and which it requires increased vigilance, and possibly an amendment of the Act, to prevent. The manufacture of chemical salts appears to be still increasing, the amount of salt decomposed during the first year of inspection having been 288,000 tons, in the second 310,000 tons, and during the third (1866) 371,950 tons. The report adds :—"It is possible to do a little more by careful management of the powers granted by the Act, chiefly by giving permanence to the habits begun, and giving stability to work which had been hastily done to meet the exigencies of the occasion, although impossible to use the Act so as to satisfy all the demands of the public when the works are in a very crowded district. The inspector can duly see that the proper arrangements are made, and that they are in order when he makes his visits. At all other periods he must leave the public to watch." Only one case (at St. Helen's) was heard during the year as legally an infringement of the Alkali Act. Several cases of escape of more than 5 per cent. have resulted in immediate alteration on representation. The following is the report on the alkali trade of the Tyne, signed by Mr. Richard Cail, hon. secretary Tyne branch, and embodied in the inspector's report :—

February, 1867.

Statistical report of the alkali trade of the Tyne branch, comprising all the manufacturers on the Tyne, and one firm having part of their works at Glasgow, which is included in the following figures, to the extent of 93 per cent. from actual returns, leaving only 7 per cent. to be computed where no return has been made, the salt decomposed being 151,700 tons.

QUANTITIES OF THE PRINCIPAL ARTICLES MANUFACTURED BY THE TYNE BRANCH IN ONE YEAR.

	Tons.		£ s.		£
Soda crystals	86,000	at	5 10	..	473,000
Soda ash and alkali	74,000	at	11 0	..	814,000
Bi-carbonate of soda	11,000	at	18 0	..	198,000
Sulphate of soda	2,400	at	4 5	..	10,200
Bleaching powder	27,000	at	14 0	..	278,000
Epsom salts	590	at	8 0	..	4,720
Caustic soda 70 per cent.	3,720	at	26 0	..	96,720
Glauber salts	20	at	6 15	..	135
Oil of vitriol for sale	9,000	at	4 0	..	36,000
Sulphate of copper	200	at	26 0	..	5,200
Muriatic acid	700	at	3 0	..	2,100
Hypo-sulphite of soda	400	at	18 0	..	7,200
Chloride of manganese	1,300	at	3 10	..	4,550
Total tons	216,330		Value		£1,929,825

Computation of the principal materials used in the manufacture of the above articles by the Tyne branch for one year, in order to show the employment given to shipping, &c., as follows :—Salt, pyrites, chalk, cliff, manganese, nitrate of soda, timber (for packages), giving employment to shipping, as follows :—

Inwards, to the extent of	466,000 tons.
Outwards (manufactured goods)	264,000 ,,
Together	730,000 tons.
Coals (a small quantity of which are carried by shipping)	340,000 ,,
Total materials carried by sea and rail	1,070,000

The above amount of 1,070,000 tons of raw material is of the value of £830,925, and exclusive of all materials used for buildings, plant, and repairs; which latter, from the nature of the acids and gases employed, cause rapid destruction, and occasion constant rebuilding and renewal.

Summary.—Tyne Branch.

Value of raw material	£730,925
Tons weight of manufactured goods	215,930
Computed value	£1,929,825
Tons weight per carriage by sea and rail	1,070,000

The inspector observes hereon, that if the same proportion is carried out elsewhere as on the Tyne, the total annual value of the alkali manufactures will be £4,750,000.

Commerce.

Commerce in New Caledonia.—A paragraph in a recent number of the *New Zealand Herald* calls attention to the progress that is being made in New Caledonia, between which and Auckland a regular trade seems likely to spring into activity. It will be remembered that New Caledonia, first discovered by Captain Cook in the year 1772, and more fully explored subsequently by the French traveller d'Entrecasteaux, is one of the most considerable islands in the South Pacific, and repeated attempts have of late years been made by the French Government to render it a permanent settlement. Great difficulties, however, would seem to be in the way of its advance, as it is upwards of eight hundred miles distance by sea from the nearest point of the Australian mainland, and nine hundred from New Zealand. It is about two hundred miles long by twenty-five broad, and is situated between the parallels of 20° and 23°, crossed by the meridian of 165° east of Greenwich. Any commercial importance that it might have with regard to England, would arise chiefly from its connection with the line of communication between India and the Australian colonies by way of Torres Straits, which separate New Guinea from the Australian mainland. "A fair sample of unthreshed rice," says the *New Zealand Herald*, "has recently arrived in Auckland from New Caledonia, which produces also coffee, sugar, cotton, and tropical fruits. We are informed that the winter is somewhat like our summer, only with more frequent rains, while the summer weather, though much hotter, is not, as might be supposed, oppressively so. The island being a long and narrow one, there is constantly a sea breeze passing over it. Extreme drought is unknown. As many as three crops of rice are taken from the same ground in the same year, the first crop only being sown, the second and third springing from the stems of the preceding one. Of maize, too, we are informed, the cultivator may take two crops in the year off the same field, or five crops in two years, though for this crop of course the land must be cultivated and planted each time. The land, we are told, is very rich, and is easily procurable from the Government. The price is 8s. per acre, but the Governor will allow emigrants to take up land on five years' credit, paying meanwhile a rent at the rate of 6 per cent. per annum on the cost. As the land produces at once, and the cultivation of it is easy, men used to labour, and with only a small capital sufficient to furnish provisions for the first eight or ten months, cannot, says our informant, fail of success. Much of the land, which is for the most part open or untimbered, is covered with rich grass, and ready at once for pasturage. The coffee plant not long since was in full berry, and so heavy, we are told, was the crop that the shrubs were literally bowed down to the ground, unable to sustain the fruit. The natives, if at times troublesome, are dealt with as natives and in French fashion. There is no interference of a Parisian Aborigines' Protection Society. Englishmen, and all foreigners indeed, are placed on the same footing as French residents—with this exception, that they are ineligible to hold Government appointments."

Colonies.

AUSTRALIAN MINERAL STATISTICS.—The mineral statistics of the colony of Victoria for 1866, as compiled by the officers of the Mining Department, comprise a great mass of information, especially regarding the condition of the gold-fields. The first subject touched upon is that of mining for gold. A large decrease in the number of miners is noticed. In 1865 the mean number of miners employed throughout the year was 83,214, and last year it was 73,577, showing a decrease of 9,637. There is a decrease in the mean number of alluvial miners of 7,592, and of quartz miners of 2,045. On the 31st December, 1866, the numbers were—alluvial miners, 55,916; quartz miners, 14,878. As regards the separate divisions the numbers stand thus: Of alluvial miners there is an increase of 217 at Ballarat division, a decrease of 268 at Beechworth, an increase of 56 at Sandhurst, a decrease of 2,260 at Maryborough, a decrease of 4,095 at Castlemaine, and an increase of 135 at Ararat. Of quartz miners there is a decrease of 1,196 at Ballarat, a decrease of 1,676 at Beechworth, an increase of 242 at Sandhurst, a decrease of 165 at Maryborough, an increase of 283 at Castlemaine, and an increase of 64 at Ararat. The total number of Chinese miners in the colony on the 31st December, 1866, was 20,134, of whom all but 34 were engaged in alluvial mining. It is not easy to enumerate these people, and it is not believed that any large decrease has taken place in their numbers as compared with 1865. The average earnings per man per annum, without distinction of classes, has been £80 8s. 3d. This amount, as compared with previous years, is large, and may be accounted for partly by the aid which the miner derives from machinery and partly from the facilities afforded him of operating on new and rich quartz-reefs, which day after day are discovered by the prospector. A table of the average earnings per man since 1860 shows that at that period they amounted to £79 9s. 3d., that they declined in 1862 to £67 17s. 10d., and that since then they have progressively increased to their present figure. The average earnings in 1866 of alluvial and quartz miners respectively are given—for the former £66 4s. 1d., for the latter £132 17s. 4¾d. These figures must not be regarded as absolutely correct, minute accuracy being impossible. The increase in the number of steam engines employed is not large; the number engaged in alluvial mining being 480, with an aggregate horse-power of 9,981, as compared with 473, of 8,208 aggregate horse-power, in 1865. Those employed in quartz-mining number 510, of 9,231 horse-power, and working 5,437 stamp-heads. The total value of the machinery is £2,068,527, being nearly double of that in use in 1859. The largest value is in the district of Ballarat, which is set down at £743,683. The number of distinct quartz reefs is 2,282, and there are 869 square miles of auriferous grounds, which have been worked more or less since the first discovery of the gold-fields. A great extent of known auriferous country still remains worked only here and there by small parties of miners. At the end of the year 76,546 acres of land were held as claims under the bye-laws, but the whole of this area was not being worked, 20,778 acres being protected by registration or exemption certificates. Comparing the number of men employed on some of the lands held under lease, they amount to 3,796, as against 5,487, which should be employed by the covenant of the leases. The value of all the "claims" throughout the country, as arrived at by a careful estimate, is £8,987,067, as against £8,498,924, the estimate for 1865. The returns of quartz crushed show an average of 10dwt. 16·2gr. per ton. In 1865 the average was 11dwt. 17·4gr. per ton. The returns from 1859 to 1866 give an average of 11dwt. 22·80gr. per ton. The average yield of gold per ton in the Beechworth district is very high, 18dwt. 3·7gr.; in the Ballarat district very low, 4dwt. 21gr. The average per ton from 145,088 tons of quartz-tailings, cement, mullock, &c., has been 4dwt. 6·43gr. The prices for crushing quartz, &c., ranged from 4s. to £1 10s. per ton. There has been a considerable increase in the number of races constructed. There are at the present time 2,249 miles of races in the colony made exclusively for mining purposes, and they have cost £319,934, or £141 6s. 3d. per mile. There were 94 water-right licenses for gold-mining purposes in force, for 264 miles of races and 298 acres of reservoirs. The quantity of water to be diverted per diem was 123,562,300 gallons, and the reservoirs were estimated to contain 227,515,552 gallons. The number of miners' rights for one year issued in 1866 was 45,637; only 19 were issued for a term of two years, 2 for three years, 23 for four years, and 1 for 15 years. Of consolidated rights, 283, representing 7,825 single rights, were issued. A summary of the mining companies registered to the end of 1866 shows the number to be 1,982, the number of shares 5,702,243, nominal capital £19,477,911. Ballarat stands at the head of the list, for £7,904,986, and Beechworth next for £5,239,925. Passing to other metals and minerals, the quantities raised during the year are said not to be large. Of silver ores 2,139 tons were raised, and 2,348 oz. of silver smelted; of black sand (mostly oxide of tin), 92 tons, of copper ores, 350 tons, of flagging, 10,400 square yards and 60 tons, of slate, 82 tons, and of magnesite, 6¼ tons. One diamond was found at Eldorado, near Beechworth. A summary of the value of metals and minerals raised in the colony from the first discovery of the gold-fields to the end of 1866 gives the value of gold obtained at £129,909,063, silver, £3,441, tin, £185,537, copper, £3,494, antimony, £27,978, coal, £2,899, kaolin, £7,028, flagging, £13,938, besides minor items; the total of mineral produce for that period being £130,154,332.

Notes.

INTERNATIONAL LITERARY CONGRESS, PARIS.—It has already been mentioned that the Société des Gens de Lettres, of Paris, intended to take advantage of the presence of the large number of visitors attracted by the Exhibition this year, to hold an international congress, with the view of discussing those subjects which interest men of letters in all parts of the world. The proposition has been well received, and the Minister of the Interior has, it is said, granted the society a subsidy of 10,000 francs towards the expenses.

SCIENTIFIC ASSOCIATION OF FRANCE.—This association, established by the Imperial astronomer, M. de Verrier, and the meetings of which are held at the Observatory of Paris, has grown rapidly into importance. It appears, by a report just issued, that it has already applied the sum of 78,000 francs in aid of important scientific experiments, and has, moreover, made a reserve of 17,000 francs for the general purposes of the association. The association now announces its intention of publishing its *Bulletin* weekly instead of monthly, as at present, and including in it notices of all scientific discoveries, accounts of new inventions, criticisms on scientific and other works, &c., and has issued the first number of the new series.

Correspondence.

PARIS EXHIBITION.—SIR,—We shall feel obliged by your early correction of an error in your published list of the recipients of the Silver Medal in Class 44 of the Paris Exhibition. The medal was awarded to Morson and Son, and not "Mawson," as printed in your *Journal* of the 5th inst. This is of some importance to us, as there is a chemical manufacturer of the latter name.—Yours, &c., T. MORSON AND SONS.

31, 33, and 124, Southampton-row, Russell-square, W.C.,
8th July, 1867.

Messrs. Schooling and Co., of North-side, Bethnal-green, also write to say that they obtained a Bronze Medal in Class 72.

MEETINGS FOR THE ENSUING WEEK.

TUES ...R. Horticultural, 3. General Meeting.
THUR ...Zoological, 4.
SAT .....R. Botanic, 3¾.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 26th June, 1867.

197. Sierra Leone, &c.—Return.
198. King Aggery—Correspondence.
301. Metropolitan Local Government, &c.—3rd Report, Evidence, &c.
373. Excise and Customs (Ireland)—Return.
Martial Law—Circular Despatch to Colonial Governors.
Public Petitions—Thirtieth Report.

Delivered on 27th June, 1867.

201. Bill—Life Policies Nomination.
206. ,, Local Government Supplemental (No. 5).
208. ,, Libel (amended).
387. Chancery and Common Law Officers (Ireland)—Returns.

Delivered on 28th June, 1867.

355. Shipping—Return.
375. Court of Admiralty—Statement.
380. Brewers, &c.—Accounts.
The *Tornado*—Correspondence, Part IX.

Delivered on 29th June, 1867.

207. Bill—Tancred's Charity (amended).
46. (v.) Trade and Navigation Accounts (31st May, 1867).
366. Lunacy—Twenty-first Report of the Commissioners.
356. Army (Whitworth Guns)—Correspondence.
388. Storm Warnings—Letter.
Public General Acts—Caps. 27 to 35.
Public Petitions—Thirty-first Report.

Delivered on 1st July, 1867.

212. Bill—County Courts Amendment.
211. ,, Chatham and Sheerness Stipendary Magistrate.
213. ,, Increase of the Episcopate.
214. ,, Naval Stores.
216. ,, Policies of Insurance (Lords' Amendments).
363. Queen Anne's Bounty—Return.
398. Education (Ireland)—Annual Report.
406. Proposed New Boroughs (Population, &c.)—Return.

Delivered on 2nd July, 1867.

215. Bill—Libel (amended).
389. The *North*—Report of Mr. Montague Bere.
392. Police (Metropolis)—Returns.
395. Postal Services (India and China)—Correspondence.
399. East London Water Bills, &c.—Report.
400. Isle of Man Lunatic Asylum—Correspondence.
401. Voters (Staffordshire)—Return.

Delivered on 3rd July, 1867.

210. Bill—Canongate Annuity Tax (Edinburgh).
379. Paris Exhibition—Correspondence.
411. Population, &c. (West Riding of Yorkshire)—Return.
Jews (Moldavia)—Correspondence.

Delivered on 4th July, 1867.

204. Bill—Master and Servant (amended).
217. ,, Sir J. Port's Charity (amended).
218. ,, Local Government Supplemental (No. 2) (Lords' Amendments.
219. ,, Lunacy (Scotland).
220. ,, Recovery of certain Debts (Scotland).
224. ,, Promissory Notes and Bills of Exchange.
390. Private Bills—Return.
415. Division of Counties, Population, &c.—Return.
Industrial Questions and Trades Unions—Correspondence.

Delivered on 5th July, 1867.

209. Bill—Admiralty Court (Ireland).
226. ,, Game Laws Amendment (Ireland).
227. ,, Trades Union Commission Act (1867) Extension.
384. House Duty—Return.
385. Licences (Wine and Beer, &c.)—Return.
396. Tancred's Charities Bill—Minutes of Proceedings.
414. Burton-on-Trent—Returns.
418. Coal Mines—Return.
Woodhouse Collection—Correspondence.
Woodhouse Collection—Appendix.

Patents.

From Commissioners of Patents' Journal, July 5th.

GRANTS OF PROVISIONAL PROTECTION.

Animal charcoal, &c., revivifying and cooling—1707—W. Orr.
Animal charcoal, retorts for manufacturing—1718—J. Fletcher.
Beehives—1775—T. Tancred.
Beverages, cooling—1751—A. M. Clark.
Brushes, manufacture of—1730—E. T. Hughes.
Clocks, transmitting the hour and synchronism of the hours between public and private—1275—H. A. Bonneville.
Cotton, &c., preparation of—1734—R. H. Barton.
Drain bottoms, bricks, &c., combination of materials for making—1732—J. Holmes.
Electric telegraphs—1755—C. and S. A. Varley.
Electric telegraphic communicators, examining coating of—1771—M. Gray.
Fabrics, finishing after cleaning or dyeing—1743—G. Ker.
Fibrous materials, drawing and spinning—1726—F. D. Frost.
Fire-arms, breech-loading—1785—J. Lang.
Fishing tackle, swivels for—1765—J. Welch.
Furnaces, adapting to burn creosote, &c.—1742—S. E. Crow.
Furnaces, smoke-consuming—1749—C. Sadler.
Galvanic batteries, flexible medico-electric—1750—R. Beard.
Gas manufacture—1748—G. McKenzie.
Gold bullion, toughening—1767—F. B. Miller.
Guns, projectiles, and cartridges—1757—G. Clark.
Heavy bodies, machinery for lifting, lowering, &c.—1760—J. Meiklejon.
Horse-shoes, substitute for roughing—1724—C. D. Abel.
Iron and steel manufacture—1747—J. Onions.
Leather tanning—1754—C. Erba.
Malt liquors, &c., revivifying—1698—J. Crompton.
Metals, rolling and shaping—1714—J. H. Johnson.
Minerals, apparatus for getting—1783—J. G. Jones.
Mines, lifts, &c., for raising minerals from—1781—J. Edwards.
Mine-shafts, preventing over-winding in—1777—W. Fairley.
Oils and fatty matters, expressing—1716—J. Thom.
Omnibuses, &c., registering number of passengers—1773—W. Cooke.
Paper manufacture—1752—W. E. Newton.
Pens and pen-holders—1759—R. W. Barnes.
Rail rods for balconies, &c.—1739—S. Tuddenham.
Railway trains, communication between passengers, guard, and driver—1737—W. King.
Railway trains, signals for—1736—S. Hancock.
Refrigerators—1738—C. Askew.
Saddles—1740—D. E. McMahon.
Saws and saw teeth—1756—W. R. Lake.
Sewing machines—1761—J. Fletcher and W. Carr.
Steam-boilers—1706—T. Holt.
Sugar, treating, &c.—1605—W. Orr.
Telegraphic insulators—1720—J. C. Fuller.
Time-keepers—1769—G. T. Bousfield.
Umbrellas and parasols—1766—J. E. Boyce and R. Harrington.
Vegetable fibres, bleaching—1712—J. Graham.
Vehicles, &c., utilising power spent in retarding the motion of—1762—C. D. Abel.
Washing powder—1412—H. A. Bonneville.
Watches, clocks, &c., repeating striking movement for—1779—C. D. Abel.
White lead, manufacture of—1728—A. M. Clark.
Windows, doors, shutters, &c.—1703—R. Logan.
Wood screws—1763—J. H. Johnson.
Wool, &c., oiling preparatory to carding—1758—L. J. Crossley and J. Sunderland.
Yarns, sizing—1744—J. Fletcher and W. Carr.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Churns—1863—W. R. Lake.
Cotton gins—1864—W. R. Lake.
Cotton, &c., metal bands for securing bales of—1880—W. R. Lake.

PATENTS SEALED.

39. B. Biggs.
43. F. B. Dœring.
48. C. F. Claus.
58. W. T. Sugg.
60. H. Doulton.
61. J. Petrie.
62. J. M. Hetherington.
72. S. P. Widnall.
80. J. Tomlinson.
90. F. Brampton.
98. S. de Wilde.
145. A. Upward.
156. W., J., and H. Harrison, and B. Croasdale.
202. W. E. Newton.
250. E. L. Ebersburg.
292. A. V. Newton.
336. W. E. Newton.
342. J. Ramsbottom.
352. W. Clark.
386. J. Ramsbottom.
699. M. J. E. Julienne.
967. J. Harker.
1297. J. Holmes.
1340. A. H. Gilman.

From Commissioners of Patents' Journal, July 9th.

PATENTS SEALED.

69. E. T. Hughes.
70. E. M. Chaffee.
71. A. G. Morvan.
75. I. Kendrick.
77. M. Henry.
83. C. de Bergue.
85. H. D. P. Cunningham.
87. W. G. Blagden.
97. G. Haseltine.
122. R. Newhall.
133. W. Weldon.
134. W. Weldon.
429. A. V. Newton.
789. C. Allhusen.
998. J. A. Bouck.
1241. J. Combe.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

1653. N. Jarvie and W. Miller.
1660. A. S. Tomkins.
1698. G. Russell.
1769. W. K. Westly.
1691. J. Wilson.
1756. R. Smith and J. Booth.
1786. J. Clayton.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

1633. B. Lambert.
1644. R. Pollit.

Journal of the Society of Arts.

FRIDAY, JULY 19, 1867.

Announcements by the Council.

Society's Visit to the Paris Exhibition.

The period fixed for the visit is from Monday, the 29th of July, to Friday, the 16th of August, so as to include the Napoleon fêtes. A reception-room has been provided for the use of the members during their stay, where their correspondence may be addressed, and where they will have the convenience of writing letters, making appointments with their friends, and where notices of all arrangements for visits to various places will be suspended. Lists of hotels and apartments will also be provided there for consultation.

The announcement of the intended visit has been received with much cordiality by the French authorities, manufacturers, and others, who have expressed their readiness to aid the Society in every possible way.

The Minister of Public Instruction has most kindly granted special permission to the members of the Society to visit the University and Lycées of Paris. The Prefect of the Seine has obligingly promised that the necessary orders shall be transmitted to the Society to enable the members to visit the catacombs, the sewers, and the municipal establishments. M. Belgrand, the inspector-general of the water service of the City of Paris, has given instructions that the great Reservoir at Ménilmontant shall be open to the members for a week. The Director of the Imperial Observatory has given instructions to admit the members to that establishment. The Director of the Mint has in like manner authorized the visits of the members to that establishment on two days in the week. The Director of Roads and Promenades of Paris has given permission to visit the Horticultural and other Municipal establishments; and M. Le Play, the commissairé-general of the Exhibition, has kindly offered to do all in his power to assist the views of the Society.

The members will be admitted to some of the most interesting and important private establishments in Paris. Amongst the firms that have at present expressed their willingness to receive the visits of the Society, may be mentioned those of MM. Cail and Cie., engineers; Lahure, and Chaix and Cie., printers; Mazaroz Ribaillier and Cie., furniture manufacturers; Hachette and Cie., publishers; and Barbédienne, artistic bronze manufacturer. All these gentlemen have responded promptly and fully to the applications made on the part of the Society, but, of course, there are times and regulations to be observed with respect to visits, which will be duly communicated to the members.

A programme is in the course of preparation, which, with a card of membership, will be forwarded to those members who have applied for them, in the course of next week. Any other members contemplating visiting Paris at this time are requested to send in their names to the Secretary immediately.

Artizans' Visits to Paris.

Her Majesty's Government have granted to the Society of Arts, in aid of the fund now being raised by the Society for assisting workmen, specially selected from various trades, to visit and report on the Paris Exhibition, the sum of £500, conditional on the Society raising a like amount by public subscription.

The following is the list of subscriptions up to the present date :—

H.R.H. the Prince of Wales, President	£31	10	0
Her Majesty's Government (conditional)	500	0	0
Society of Arts	105	0	0
Earl Granville, K.G.	5	0	0
Lord de L'Isle	10	0	0
Thomas Twining	2	2	0
Sir J. P. Boileau, Bart.	5	0	0
George Godwin, F.R.S.	1	1	0
Vice-Chancellor Sir W. Page Wood, F.R.S.	10	0	0
W. H. Bodkin (Assistant-Judge)	3	3	0
Sir Rowland Hill, K.C.B.	3	3	0
Benjamin Shaw	2	2	0
Alfred Davis	10	10	0
Eugène Rimmel	5	5	0
Frederick Mocatta	2	2	0
James Marshall	2	2	0
Robert Dawbarn	1	0	0
Henry Vaughan	10	10	0
Philip Sancton	5	0	0
Somerset A. Beaumont	5	0	0
Decimus Burton, F.R.S.	1	0	0
W. Botly	1	1	0
Professor Robert Bentley	2	2	0
John Stuart Mill, M.P.	1	1	0
G. F. Wilson, F.R.S.	2	2	0
Henry Creed	1	1	0
The Marquis of Salisbury, K.G.	10	0	0
D. Roberton Blaine	2	2	0
William Hawes	2	2	0
Seymour Teulon	1	1	0
G. N. Hooper	2	2	0
Lord Taunton	5	0	0
Henry Cole, C.B.	1	0	0
A. Robb	1	1	0
S. Andrews	1	1	0
Thomas Dixon	1	1	0
Charles Telford	1	1	0
Edmund Burke	2	0	0
W. H. Gore Langton, M.P.	5	0	0
J. R. Fowler	1	0	0
John Rutson	1	1	0
W. Fothergill Cooke	2	2	0
J. P. Gassiot, F.R.S.	5	5	0
The Duke of Devonshire	10	0	0
Messrs. Chawner and Co.	2	2	0
Chas. Brooke, F.R.S.	1	1	0
T. Chappell	2	2	0
C. Candy	2	0	0
Alfred Haines	2	2	0
Major-General Sir William Gordon, K.C.B.	2	2	0

Bartlett Hooper	2	2	0
F. Richardson	1	1	0
J. Sharples	3	3	0
Henry Johnson	2	2	0
C. Skipper, jun.	1	1	0
G. T. Saul	1	1	0
Alderman D. H. Stone	5	5	0
G. H. Walker	1	1	0
R. Worthington	2	2	0
A. W. Miles	2	2	0
J. Harris Heal	2	2	0
John Bell	1	0	0
Messrs. Mander and Co.	2	2	0
B. S. Cohen	1	1	0
John Corbett	1	1	0
J. Zaehnsdorf	0	10	0
Major-General Viscount Templetown, C.B.	5	0	0
J. Pearce	3	3	0
Messrs. Huntley and Palmer	2	2	0
A. Glendining, jun.	1	1	0
A. Trevelyan	2	2	0
S. Harrington	1	1	0
Montague Ainslie	2	2	0
James Bentley	2	2	0
Capt. R. P. Oldershaw	1	0	0
E. C. Tufnell	2	2	0
Samuel Redgrave	1	0	0

Collected in response to a Circular issued by the Birmingham Chamber of Commerce.

G. Dixon, Mayor of Birmingham	5	5	0
Messrs. Smith and Wright, Birmingham	5	5	0
Messrs. Griffiths and Browett, Birmingham	5	5	0
Henry Weiss, Birmingham	2	2	0
W. H. M. Blews, Birmingham	2	2	0
W. Middlemore, J.P., Birmingham	5	5	0
Thomas Lloyd, Birmingham	2	2	0
Messrs. Elkington and Mason, Birmingham	5	5	0
Messrs. John Hardman and Co., Birmingham	2	2	0
Messrs. F. and C. Osler, Birmingham	5	5	0
The Proprietors of the *Birmingham Journal and Daily Post*	2	2	0
The Proprietors of the *Birmingham Gazette*	2	2	0
R. L. Chance, Birmingham	2	2	0
T. Avery, Birmingham	2	2	0
W. Tonks and Sons, Birmingham	2	2	0
W. Lucas Sargant, Birmingham	2	2	0
— Mountain (Messrs. Walter, May, and Co.), Birmingham	2	2	0
J. A. Williams, Birmingham	2	2	0
Henry Charlton, Birmingham	2	2	0
W. Bartlett and Sons, Birmingham	5	0	0
John P. Turner, Birmingham	0	10	6
W. H. Avery, Birmingham	2	2	0
Messrs. Peyton and Peyton, Birmingham	3	3	0
James Cartland, Birmingham	2	2	0
Messrs. Smith and Chamberlain, Birmingham	2	2	0
Messrs. Baker and Son, Birmingham	2	2	0
Messrs. Hinks and Wells, Birmingham	2	2	0
Messrs. Van Wart and Co., Birmingham	5	0	0
Messrs. Evans and Askin, Birmingham	2	2	0
C. Shaw, Birmingham	2	2	0
James Barwell, Birmingham	1	1	0

Subscriptions may be forwarded to the Financial Officer, at the Society's House.

The Council are now prepared to receive the names of any workmen recommended by their respective trades as fit and proper persons to undertake this important duty on behalf of their fellow workmen.

PROGRAMME OF EXAMINATIONS FOR 1868.

PRELIMINARY NOTICE.

I. The Examinations described herein have been established for the benefit of the members and students of Institutions in Union with the Society of Arts. Such persons are commonly mechanics, artisans, soldiers,* labourers, clerks, tradesmen and farmers in a small way of business, apprentices, sons and daughters of tradesmen and farmers, assistants in shops, and others, of various occupations, who are not graduates, undergraduates, nor students of a University, nor following nor intending to follow a learned profession, nor enjoying nor having enjoyed a liberal education. To all such members and students in the Institutions, and to other persons of the like condition, male and female, the Examinations, certificates, and prizes, described in this programme, are open on the general conditions stated herein. Persons, however, who are, or have been, professional teachers or pupil teachers; persons who either are enjoying or have enjoyed a liberal education, or who occupy a higher position in society than those above described, may obtain certificates, but cannot compete for the prizes, of which particulars are given at pages 565 and 566.

II. The certificates are not competed for. They are awarded as records of positive, not comparative, attainment. The prizes are competed for.

III. For the conditions on which persons of a higher grade in society may be examined and receive certificates, but not compete for prizes, see paragraph 4 (D).

IV. The Candidates for Examination have not to go to a distance from their homes. The Examinations are held in all places in the United Kingdom where a Local Educational Board connected with the Society of Arts is willing to make the requisite arrangements.

V. For a list of the Local Boards already formed, see page 566.

VI. For instructions as to the formation of Local Boards and their duties, see page 559.

The EXAMINATIONS are—

(1.) The Previous Examinations by District Unions and Local Boards for ascertaining the fitness of Candidates to present themselves at the Final Examination.

(2.) The Final Examination by the Society of Arts Board of Examiners, under the supervision of the Local Boards.

PREVIOUS EXAMINATIONS BY DISTRICT UNIONS AND LOCAL BOARDS.

1. The object of these Examinations is to "sift" the Candidates for the Final Examinations, so as to keep back (1) those who are not fairly grounded in the elements of education—spelling, writing, and arithmetic—and (2) those who are not fairly acquainted with the subject or subjects in which they desire to be examined by the Society of Arts, and are therefore unlikely to succeed in

* The following circular memorandum (Gen. No. 331), addressed to the army at home, has been issued:—"Miscellaneous 1 (1865).—The Field Marshal Commanding-in-Chief desires it to be notified that there will be no objection to soldiers, their wives, and families, being permitted to present themselves for instruction and examination at the Educational Institutes in connection with the Society of Arts, on the understanding that they are not on that account to be exempt from any military duty, nor, except in special cases, to be out of barracks after watch-setting or tattoo.—By command of his Royal Highness the Field Marshal Commanding-in-Chief, James Yorke Scarlett, Adj. Gen.—Horse Guards, S.W., 11th March, 1866."

that Examination. The sifting in the above-named elementary subjects may be effected at the discretion of the Local Boards; they should examine their Candidates in spelling and writing by dictating to them a passage from an English author for them to write down; in arithmetic by setting them moderately easy questions to work out in the usual manner. The best mode of sifting the Candidates in the special subjects in which they desire to be examined by the Society of Arts is for the Local Boards to examine them therein by means of printed (or written) questions and written answers; but, where a Local Board finds itself without the means of conveniently holding such an Examination in any special subject, such Board may satisfy itself in any other mode, and state simply that it has satisfied itself, that the Candidate is fit to be examined by the Central Board in that subject.

2. The Previous Examinations must be held sufficiently early in the year to enable the proper returns to be made, as explained in par. 6.

FINAL EXAMINATION BY THE SOCIETY OF ARTS.

3. No Candidate can be admitted to the Final Examination unless duly returned by a District Union or Local Board as having passed a Previous Examination.

4. Every admitted Candidate must be at least 16 years of age.

(A.) Members of, or students of classes in, Institutions in Union with the Society of Arts, are examined .. .. Free.

(B.) Members of, or students of classes in, Small Institutions,* not in Union with the Society of Arts, but subscribing one guinea a year for admission to the Examinations alone, are examined .. .. Free.

(C.) Members of, or students of classes in, "Small Institutions"* not in Union with the Society of Arts, but connected with it through a District Union or Local Board, are examined on payment of a fee of .. .. 2s. 6d.

N.B.—It will be understood that Candidates coming under the heads *(A)*, *(B)*, or *(C)* must not be of a higher class in society than those described in par. I. of the Preliminary Notice.

(D.) Persons of a higher class of society than those described in paragraph I. (Preliminary Notice), cannot compete for prizes, but may be examined for certificates on payment of a fee of .. .. 5s.

5. The Council in every case require the Local Boards to certify whether a Candidate should pay this higher fee; and it is earnestly hoped that in any instance where a Local Board has reason to believe that a Candidate is or has been a teacher, or that he or his parents occupy such a position in society, or are in such easy pecuniary circumstances as to disqualify him, according to the regulations, for competing for a prize, they will at once, in case of certainty, return him as not competing for a prize, or in case of doubt, communicate with the Secretary of the Society of Arts.

6. A copy of Form No. 2 will be forwarded to the Secretary of each Local Board, and must be filled up and returned to the Secretary of the Society of Arts before the 12th of March. The requisite number of forms No. 4 will then be forwarded, and these, when filled up, must be returned not later than the 30th of March. Each of these forms, when returned, will be numbered at the office of the Society of Arts, and a card for each candidate, with his name and his number, will afterwards be forwarded to the Secretary of the Local Board for distribution, together with copies of the time-table.

7. The printed papers of questions in the various subjects will be afterwards forwarded to the Secretary of the Local Board; details as to the mode in which the Final Examination is to be conducted are contained in the Letter of Instructions (Form No. 6), and members of the Local Boards should make themselves thoroughly acquainted with them.

8. When the Candidates' papers have been submitted to the judgment of the Society's Examiners, certificates of three grades will be awarded, and the names of the Candidates who obtain prizes and certificates will be afterwards published in the *Journal of the Society of Arts*.

9. A Candidate who has obtained from the Society a certificate of the 1st class in any subject cannot again be examined in the same subject; but a Candidate who has obtained a certificate of the 2nd or 3rd class may, on the recommendation of the Local Board, be examined in the same subject, in a subsequent year, without again passing the Previous Examination.

10. A Candidate who, having obtained a certificate in any subject, desires to be examined in some other subject, in a subsequent year, may be "passed" by the Local Board, after an examination in that subject, without re-examination in the elementary subjects; but, in all cases, the name must be returned in the proper form.

11. Particulars of the subjects for the Final Examination are given below.

12. The Time-table has been drawn up to meet the general convenience of the Candidates; and *no variation* of it can *possibly* be allowed, so that, in choosing the subjects in which they desire to be examined, Candidates must take notice of the arrangements of this Time-table, as they *cannot* be examined in *two* subjects which are set down for the same evening. The days and hours of Examination must be *strictly* adhered to.

13. The Examiners will reject all ill-written, ill-spelt, ill-composed, or ungrammatical papers that may be laid before them.

Time-Table for 1868.

Tuesday, 21st April, From 7 to 10 p.m.	Wednesday, 22nd April, From 7 to 10 p.m.	Thursday, 23rd April, From 7 to 10 p.m.	Friday, 24th April, From 7 to 10 p.m.
Arithmetic.	Book-keeping.	Algebra.	Geometry.
Trigonometry.	Navigation.	Practical Mechanics.	Mensuration.
Electricity and Magnetism.	Conic Sections.	Animal Physiology.	Principles of Mechanics.
Light and Heat.	Chemistry.	Political and Social Economy.	Botany.
Mining and Metallurgy.	Music.	French.	Geography.
Geometrical Drawing.	Domestic Economy.	†English Literature.	Latin.
German.	English History.	Fruit and Vegetable Culture.	Logic and Mental Science.
Floriculture.	Italian.	Freehand Drawing.	Spanish.

† Two papers of one hour and a half each in this subject are considered as one.

LOCAL EDUCATIONAL BOARDS.

14. Local Boards may be formed wherever the managers of Institutions, or other persons, may be prepared to co-operate with the Society of Arts.

15. Each Local Board must consist of at least three members, and must have a Chairman and a Secretary. The district for which the Board is to act should be defined, and the composition of the Board must be such as to command the respect and confidence of the neighbourhood. No member or officer of a Local Board can be admitted to examination.

16. The duties of the Local Boards may be defined as follows:—

(*A.*) To give publicity to the system of Examinations by the circulation of the programmes, hand-bills, &c. (copies of which will be furnished *gratis* on application), and to give encouragement and advice to those young persons who are likely to become candidates.

(*B.*) To hold the Previous Examinations.

(*C.*) To superintend the Final Examinations.

* Small Institutions are defined as those which have an income of less than £75 a year.

17. Local Boards make no payment to the Society, unless they exercise the power of admitting candidates who are not members of any Institution in Union with the Society of Arts (see par 4 *C.*); in which case a subscription of one guinea a year must be paid.

18. A detailed list of each Local Board (giving the exact address of the Secretary) must be submitted to the Council of the Society of Arts before the 1st of February, 1868, when the general list of such Boards will be published; and where a Local Board comprises so large a district that, for the convenience of the candidates, Branch Local Boards have to be formed, lists of these must also be given. All changes in the composition of the Boards must be notified to the Society of Arts.

19. N.B.—Local Boards may also usefully direct their attention to the holding of Preparatory Examinations in Elementary Subjects, either upon the system described at page 16, or upon any other system that they may prefer.

SUBJECTS FOR THE FINAL EXAMINATION IN 1868.

20. In the following paragraphs will be found brief outlines of the subjects in which candidates may be examined, and their attention is especially drawn to this part of the Programme. In many instances the Examiner has set down certain Text-books; but, in most cases, a candidate may exercise his own judgment as to what Text-book he uses; real knowledge, however or wherever acquired, will be accepted by the Examiners. In the following subjects, however, Political Economy, English History, English Literature, Logic, Latin and Roman History, French, German, Italian, and Spanish, the course of study is necessarily prescribed with more or less exactness.

I.—ARITHMETIC.

Examiner.—Rev. Alexander Wilson, M.A., National Society, London.

21. Practice—Simple and Compound Proportion—Interest—Discount—Insurance—Vulgar and Decimal Fractions; with the principles of a Decimal Notation in money on the basis of the pound unit.

22. The questions framed from the preceding syllabus will consist mainly of practical problems, and the Examiner will take into account not only the correctness of the answers, but also the excellence of the methods by which they are worked out, and the clearness and neatness of the working, *which must always be shown.*

23. Text Books:—Any of the modern treatises on Arithmetic, such as Hunter's Text Book *(National Society)*, Colenso *(Longmans)*, or Barnard Smith *(Macmillan)*.

II.—BOOK-KEEPING BY DOUBLE ENTRY.

Examiners.—John Ball, Esq., of the firm of Messrs. Quilter and Ball, and Robert G. C. Hamilton, Esq., Principal Accountant to the Committee of Council on Education.

24. Candidates should be prepared to answer questions as to the nature and use of the different books usually kept in a merchant's office; to journalise a series of transactions from a waste book, and having posted the entries to the ledger, to balance the accounts, to prove the correctness of the postings by a trial balance, and finally to exhibit an account of profit and loss, and a balance sheet.

25. Text Books:—Rudimentary Book-keeping *(Weale's Series)*. Kelly's Elements of Book-keeping *(Simpkins and Co.)*. Examination-Questions in Book-keeping by Double Entry, by the Rev. J. Hunter, M.A. *(Longmans)*.

III.—ALGEBRA.

Examiner.—Rev. T. P. Hudson, M.A., Fellow and Tutor of Trinity College, Cambridge.

26. Elementary Operations and Fractions, Simple and Quadratic Equations and Problems leading to them. Involution and Evolution. Surds. Arithmetical, Geometrical, and Harmonic Series. Combinations and Permutations. Binomial Theorem. Scales of Notation. Interest and Annuities. Elementary Theory of Probabilities.

27. Text Books:—Todhunter's Algebra (*Macmillan*), Colenso's Algebra (*Longmans*), Lund's or any other modern treatise on Algebra.

IV.—GEOMETRY.

Examiner.—Rev. B. Morgan Cowie, M.A., Professor of Geometry at Gresham College; one of H.M. Inspectors of Schools.

28. To obtain a first-class certificate, at least six problems and four propositions must be correctly done; to obtain a second-class, at least four problems and six propositions.

29. Text Books:—Euclid, Books I., II., III., IV., VI., XI., as far as Prop. 21. Potts' smaller edition *(Parker)*. Green's Euclid's Plane Geometry, practically applied, is a useful help to those who are studying by themselves (*Heywood*, Manchester; *Simpkin, Marshall, and Co.*, London).

V.—MENSURATION.

Examiner.—John Sykes, M.A., Assistant-Secretary to the Committee of Council on Education.

30. The calculation of the areas and circumferences of plane figures bounded by arcs of circles or right lines, and solid contents of cones, cylinders, spheres, &c. Candidates will be expected to be familiar with the different rules for measuring and estimating artificers' work, such as joiners', bricklayers', masons', and plumbers' work, and to be able to prepare estimates of such work from given quantities.

31. Text Books:—Lund's Mensuration, Part III. of his Elements of Geometry and Mensuration. Tate's Mensuration. Young's Treatise on Mensuration *(Simms and M'Intyre)*.

32. The Examiner, in speaking of last year's work, says:—"There are, as usual, several cases in which the working ought to have had more explanation."

VI.—TRIGONOMETRY.

Examiner.—Rev. T. G. Hall, M.A., Professor of Mathematics in King's College, London.

33. In Plane Trigonometry, the formulas for the trigonometrical functions of angles, the numerical solution of plane triangles, the use of logarithmic tables, and angular and exponential series.

34. Spherical Trigonometry, Napier's Rules, and the Solution of Spherical Triangles.

35. Text Books:—Snowball's or Todhunter's Trigonometry, Trigonometry for Schools, and for Spherical Trigonometry (*Christian Knowledge Society*), or any other of the modern treatises on Trigonometry. Mathematical Tables (Chambers' Series).

VII.—CONIC SECTIONS.

Examiner.—Rev. Bartholomew Price, M.A., F.R.S., Sedleian Professor of Natural Philosophy in the University of Oxford.

36. The properties of the three curves treated geometrically; also as deduced from the cone. The principles of projection, orthogonal and central, applied to derive the properties of the conic sections from those of the circle.

37. Analytical Conics, including the equations of the straight line, the circle, the three conic sections, and the general equation of the second degree.

38. Text Books:—Drew's Conic Sections (*Macmillan*). Taylor's Conic Sections (*Macmillan*). Salmon's Conic Sections (*Longmans*). Todhunter's Conic Sections (*Macmillan*).

VIII.—NAVIGATION AND NAUTICAL ASTRONOMY.

Examiner.—Rev. Joseph Woolley, LL.D., Director of Education for the Admiralty, and Inspector-General, Royal School of Naval Architecture and Marine Engineering, South Kensington Museum.

39. A good knowledge of Plane and Spherical Trigonometry, of the definitions and terms used in Nautical Astronomy, and of the various measurements of time and

their mutual conversions will be required, as well as skill in the use of logarithmic tables, and neatness, order, and accuracy in the numerical solutions of problems.

40. The candidate should understand the construction of charts; the nature and laws of circular storms; great circle sailing, &c.; the methods of determining the latitude, longitude, variation of the compass, and error and rate of a chronometer by astronomical observations, with the demonstrations of the formulæ employed; the use of nautical astronomical instruments, &c.

41. Text Books:—The Nautical Almanac (*Murray*). Riddle's Navigation and Nautical Astronomy (*Law*, Essex-street).

42. N.B.—Candidates in this subject should be allowed the use of the Nautical Almanac and Tables *during the Examination*.

IX.—Principles of Mechanics.

Examiner.—Rev. Jonathan Bates, M.A., late Fellow of Gonville and Caius College, Cambridge.

43. The properties of matter, solid, fluid, and gaseous.

44. Statics: The composition, resolution, and equilibrium of pressures acting on a material particle, and on constrained particles; machines; attractions.

45. Dynamics: The laws of motion; impact, projectiles; constrained motion; central forces; oscillation.

46. Rigid Dynamics: Motion of a rigid body about a point;—of a free rigid body;—of a system of rigid bodies.

47. Hydrostatics: Pressures of fluids; equilibrium of floating bodies; specific gravity; elastic fluids; machines; temperature and heat; steam; evaporation.

48. Hydrodynamics: Motion and resistance of fluids in tubes, &c.; waves and tides.

49. Pneumatics: Mechanical properties of air; the barometer, and other machines illustrating the mechanical properties of air.

50. Text Books:—Todhunter's Statics, or Parkinson's Mechanics. Goodwin's Mathematics. Miller's, Phear's, or Besant's Hydrostatics. Webster's Theory of Fluids. The treatises on these subjects in Orr's Circle of the Sciences. Golding Bird's Elements of Natural Philosophy, by C. Brooke *(Churchill)*. Lardner's Handbooks on Natural Philosophy. Tate's Examples in Mechanics. Baker's Statics and Dynamics *(Weale's Series)*. Twisden's Practical Mechanics. Rankine's Applied Mechanics.

X.—Practical Mechanics.

Examiner.—T. M. Goodeve, Esq., Professor of Mechanics at the Royal Military Academy, Woolwich.

51. The applications of the principles of Mechanism to Simple Machines. The Steam Engine.

52. Text Books:—Bourne's Catechism of the Steam Engine (*Longmans*). Scott Russell on the Steam Engine. Nasmyth's Elements of Mechanism, with remarks on Tools and Machinery (*Weale*). Goodeve's Elements of Mechanism, second edition (*Longmans*).

XI.—Magnetism and Electricity.

Examiner.—Charles Brooke, Esq., M.A., F.R.S., Pres. M.S.

53. Construction and Properties of Magnets; Magnetic Instruments; Terrestrial Magnetism; The Mariner's Compass and its deviations in iron ships; Diamagnetism.

54. Franklinic Electricity; Voltaic Electricity; Electro-dynamics; Electro-telegraphy; Electro-metallurgy; Thermo-Electricity; Organic Electricity.

55. Text Books:—Elements of Natural Philosophy, by C. Brooke (*Churchill*). Lardner's Handbooks of Natural Philosophy (*Walton and Maberly*). Jamin, Cours de Physique, Becquerel, Traité de l'Électricité et de Magnétisme.

XII.—Light and Heat.

Examiner.—Richard Potter, Esq., A.M., late Professor of Natural Philosophy and Astronomy in University College, London.

56. What is the sense of sight?—ancient theories—modern definitions and hypotheses of the nature of light—the especial privileges of animals which possess organs of vision—the simple laws or properties of light required to be known before we can discuss the structure of the eye, and the construction of telescopes, miscroscopes, and other optical instruments—what are foci of pencils of rays—how formed by reflection and refraction—real and virtual foci—optical images real and virtual—how do they occur in optical instruments.

57. Why do we distinguish between Physical and Geometrical optics?—what are double refraction of light—polarisation of light—interference of light—examples of these properties, how shown—phenomena of recurring colours—examples—how are explained the colours of the soap bubble—the colours seen on looking towards a light through the feathers of small birds—the colours of mother-of-pearl—the rainbow, &c., &c.—the laws of the interference of polarised light—to describe cases of these splendid phenomena.

58. What are the definitions of heat, radiant, latent, and sensible?—what is meant by caloric?—hypotheses of the nature of heat—capacity of bodies for heat—the temperature of bodies—how measured by instruments—descriptions of thermometers and pyrometers—the scales of thermometers—how compared—how the volumes of solids, liquids, and gases depend on their temperature—absolute zero of cold—elastic force of vapours and gases produced by heat employed in steam and air engines—winds from the unequal heat of the atmosphere. What are the connections and analogies of heat and light?

59. Text Books:—The Library of Useful Knowledge. Brewster's Optics (Cabinet Cyclopædia). Potter's Physical Optics, the descriptive and experimental treatise or first part *(Walton and Maberly)*.

XIII.—Chemistry.

Examiner.—A. W. Williamson, Esq., F.R.S., Professor of Chemistry, University College, London.

60. Preparation and properties of the chief gases, acids, bases, and salts. Laws of combining proportion by weight and by volume. Analytical processes for the detection and separation of metals, acids, &c. Preparation and distinctive properties of the chief kinds of alcohol, of organic bases, fixed and volatile organic acids, sugars, woody fibre, starch, &c.

61. Candidates are expected to be able to explain chemical reactions by the use of symbols. Questions illustrative of general principles will be selected from the following, amongst other manufactures:—Metallurgy of lead, iron, and copper; bleaching, dyeing, soap-boiling, tanning; the manufacture of coal-gas, sulphuric acid, soda-ash, &c.

62. Text books:—Miller's Elements of Chemistry, Williamson's Chemistry for Students.

63. The Examiner, in speaking of last year's work, says:—"Many of the papers leave a good deal to be desired in the way of accuracy. Teachers of chemistry are apt to include in their courses of instruction a wide. range of facts than their pupils can thoroughly masterr Eaah step in the study of the science ought to be firm and clear, and even the very first steps ought to be samples of accuracy and clearness."

XIV.—Mining and Metallurgy.

Examiner.—J. Arthur Phillips, Esq., Civil Engineer, Graduate of the Imperial School of Mines of France, &c.

64. Candidates should be able to identify with facility the ores of the more common metals, and be acquainted with their chemical composition. They should also be familiar with the forms of occurrence of the various metallic ores, and the usual methods employed for their extraction and subsequent purification by crushing, stamping, washing, &c. Underground surveying, the principles of ventilation, particularly as applicable to collieries; a knowledge of furnace assaying, and a general acquaintance with the metallurgy of the more important metals are also required.

65. First-class certificates can be given to those only

who have either acquired some practical knowledge of mining, or who possess a special acquaintance with the metallurgy of at least one of the useful metals.

66. Text Books:—Dana's Mineralogy *(Trübner and Co.*, Paternoster-row). Mitchell's Assaying *(Baillière)*. Manual of Metallurgy *(Griffin)*. Useful Metals and their Alloys *(Houlston and Wright)*. Ure's Dictionary of Arts, Manufactures, and Mines *(Longmans)*. Percy's Metallurgy *(Longmans)*. Metallurgy of Iron, Truran *(Spon)*. Mining and Metallurgy of Gold and Silver *(Spon)*.

XV.—Botany.

Examiner.—Daniel Oliver, Esq., F.R.S., F.L.S., Keeper of the Herbarium at the Royal Gardens, Kew, and Professor of Botany in University College, London.

67. Sect. I.—The Structure of Plants and Vegetable Physiology. The Functions of the Various Organs, and their Morphological Relations. The Nature of the Principal Tissues. The meaning of Botanical Terms. The application of Structural and Physiological Facts to Practical Purposes.

68. Sect. II.—Systematic Botany. The general Principles upon which the Classification of Plants is based. The distinctive characters of the principal British Natural Orders of Plants. Naming Common Wild Flowers at Sight. The sources of the most important Economic Vegetable Products:—Timbers, Fibres, Fruits, Drugs, &c.

69. Sect. III.—Descriptive Botany. The Art of Describing Plants correctly in Scientific Language.*

70. Text Books:—Lindley's School Botany (*Bradbury and Evans*). Oliver's Lessons in Elementary Botany (*Macmillan*). Lindley's Theory and Practice of Horticulture (*Longmans*). Oliver's Guide to the Kew Museums (pamphlet) (*L. Reeve and Co.*).

71. Candidates will be expected to return three correct answers to questions in Section I., three in Section II., and at least two of the plants must be described and referred to their respective natural orders in Section III.

72. Students are very strongly recommended to the frequent practice of describing plants; at first on forms or "schedules," as given in Professor Oliver's "Lessons," page 59, and, when sufficiently advanced, in detail, as in the examples given at page 298 of the same work, and in Dr. Lindley's "School Botany."

XVI.—Floriculture.

Examiner.—Thomas Moore, Esq., F.L.S., Curator of the Botanic Gardens, Chelsea, and Floricultural Director of the Royal Horticultural Society.

73. The leading Flowers of the different seasons, and how obtainable, whether by natural or artificial means, and under what modes of treatment.

74. Special Culture—Ferns, Orchids, Cacti, Heaths, Hardy Annuals, Bedding Plants.

75. Practical Operations.—Potting, Planting, Pruning, Training, Watering, Shading, Ventilating.

76. Flower-garden.—Pleasure-ground and shrubbery planting, materials for;—Flowering plants; Foliage plants. Sub-Tropical gardening. Geothermal culture. Lawns, formation and management of.

77. Flowering: how to induce or prevent by cultural agency. Influence of treatment on the formation and development of buds—leaf buds and blossom buds. Action of light on plants. Flower forcing.

78. Propagation.—The various modes of, and their special adaptations. Composts for different classes of plants. Acclimatization. Improvement or ennobling of races. Hybridization and cross-breeding.

79. Construction and warming of houses for plant culture. Atmospheric condition of plant houses. Influence of ventilation on plants grown in glass-houses. Ward's cases.

80. Text Books:—Lindley's Theory and Practice of Horticulture *(Longmans)*. McIntosh's Book of the Garden *(Blackwood and Sons)*. Thomson's Gardener's Assistant *(Blackie and Son)*.

81. The Examiner, in speaking of last year's work, repeats the recommendation before made, that "candidates should, as a part of their studies, practice the writing out of short pithy remarks on each of the subjects set down in the programme, comparing their own remarks with the statements in the text books, and repeating this from time to time, cutting out all superfluous words, so that they may get the essential particulars well impressed on the memory, and at the same time acquire a clear and condensed style of writing."

XVII.—Fruit and Vegetable Culture.

Examiner.—Robert Hogg, Esq., LL.D., F.L.S.

82. Sect. I.—Fruit-Tree Culture.—Kinds of Fruits adapted for various soils and exposures. The Propagation, Pruning, and Training of Fruit-trees. The Structure and Functions of the Organs of Trees, considered in their relation to growth and reproduction. The Forcing of Fruit-trees, and their Cultivation under glass, both in and out of pots. The Theory of Ripening, and the Principles that ought to Regulate the Preservation of Fruits after they are Ripe or their subsequent Maturation. The Packing of Fruit for transmission to great distances.

83. Sect. II.—Vegetable Culture.—The kinds and quantities of vegetable seeds and roots required for cropping gardens of given dimensions. The most approved mode of culture of the different kinds of vegetables and salads. The preparation of fermenting materials for artificial heating. The forcing of vegetables and salads.

84. Sect. III.—General subjects.—Soils, Water, Atmospheric Air, Light and Heat, in their relation to the successful cultivation of Fruit and Vegetables. Manures and their application. The Diseases and Insects to which Fruit-trees and Vegetables are subject, and their remedies. The erection, heating, and ventilation of garden structures.

85. Text Books:—Lindley's Theory and Practice of Horticulture (*Longmans*). The Cottage Gardener's Dictionary (*Bell and Daldy*). Hogg's Fruit Manual, 3rd edition (171, *Fleet-street*). Rivers' Miniature Fruit Garden (*Longmans*). Bréhaut's Modern Peach Pruner (171, *Fleet-street*).

XVIII.—Animal Physiology in Relation to Health.

Examiner.—Dr. Michael Foster, Director of the Physiological Laboratory, and Teacher of Practical Physiology and Histology, University College, London.

86. The general principles of Animal Physiology, and the application of them to the preservation of health and to the wants and emergencies of daily life.

87. Text Books:—Huxley's Lessons in Elementary Physiology (*Macmillan*). Carpenter's Animal Physiology, 1859 *(Bohn)*. Mapother's Physiology and the Principles of Disease *(Longmans)*. Mapother's Lectures on Public Health *(Longmans)*. Lardner's Animal Physics *(Walton and Maberly)*. Translation of Milne Edwards' Manual of Zoology (*Renshaw*). Marshall's Descriptions of the Human Body, with Atlas (*Day and Son*), for details of Anatomy.

88. The Examiner, speaking of last year's work, says:—"A large number of the candidates were more anxious to show that they had learned by heart a series of technical terms than to make it clear to the examiner that they really understood what they were writing about. There was too much book-work—too little reflection over what had been read. There were also many instances of bad spelling, not only of technical, but also of common words."

XIX.—Domestic Economy.

Examiner.—Edward Carleton Tufnell, Esq., one of Her Majesty's Inspectors of Schools.

89. Candidates will be expected to possess such a knowledge of the essential elements of Mechanical and

* Living plants are provided by the Society for this examination.

Chemical Physics, Chemistry,* and Physiology, and of the general outlines of Natural History, as may enable them to describe the origin and properties of the articles, and the rationale of the processes indicated or suggested by the following heads, as well as to explain the practical rules which science suggests for the promotion of health and comfort, and for turning limited means to the best advantage:—

90. Dwellings for town or country; site, general design, details of parts, materials and processes of construction and decoration; fixtures and fittings; furniture, fabrics, and clothing; the philosophy of food based on the functions and requirements of the human frame, and on the chemical and hygienic properties of proximate constituents; unwholesome food; adulterations; preservation; condiments; culinary processes; refreshing, stimulating, and intoxicating beverages; fuel and other household stores; means for promoting a vigorous development of the frame, and for maintaining the healthy exercise of its functions; means of safety; the care of the sick; household management and accounts; best ways of investing savings and of providing against emergencies.

91. The questions will be comprehensively framed, so as to give to candidates a free scope for making evident the extent of their studies in the various departments of Domestic Economy. Sound practical notions of the most essential points throughout the whole range of subjects are desired, rather than a deep knowledge of a few of them.

92. Text Books:—Tegetmeier's Domestic Economy (*Home and Colonial School Society, Gray's Inn-road*). Healthy Dwellings, &c., a lecture by Henry Roberts, F.S.A. (*Ladies' Sanitary Association*, 8, *Pont-street, Belgrave-square*). The Useful Arts employed in the Construction of Dwelling-houses; in the Production of Clothing and of Food (*Longmans*). Lankester's Lectures on Food, 1st and 2nd Course. Tomlinson's Warming and Ventilating (*Weale's Series*). The necessary Physical, Chemical, and Physiological knowledge may be obtained from Chamber's Educational Course on the Sciences (*W. and R. Chambers*).

XX.—Political and Social Economy.

Examiner.—Charles Neate, Esq., M.A., M.P., late Professor of Political Economy in the University of Oxford.

93. The examination will be devoted to the study of Civil Government and Social Economy, as set forth in the 3rd and 4th books of Stephens' Commentaries on the Laws of England. N.B.—In order to meet the question of expense as regards this work, candidates are informed that the earlier editions, which are obtainable at a reduced price, may be used, so long as they are not earlier than the 3rd edition.†

94. Professor Fawcett's Manual of Political Economy (*Macmillan*) must be studied by those who desire to obtain first-class certificates.

XXI.—Geography.

Examiner.—Wm. Hughes, Esq., F.R.G.S., Professor of Geography in King's College, London.

95. Candidates must show a sound knowledge of Elementary Geography, physical and descriptive. Such knowledge must embrace an acquaintance with at least the outlines of the great natural features of the globe, the political divisions of countries, and the localities of towns and other places of importance. This knowledge will be looked for in fuller extent with regard to the British Islands, and the various portions of the British Empire, than with regard to other countries. The recent changes in the map of Europe—especially in the cases of Germany and Italy—with the altered relationships between the various German States, may also be referred to as amongst the topics that prominently demand attention on the part of the geographical student. Australia, New Zealand, and Germany (the last-named with reference to the changes consequent on the war of 1866), are proposed as subjects for more especial study on the part of the intending candidates for the ensuing year's examinations. In evidence of the knowledge possessed regarding those regions, the candidate will be required to sketch, from memory, a map of any one of the Australian colonies, or of any single European country, that may be named by the examiner. Such sketches need not possess accuracy of detail, but should at least show the general direction of coast-lines, mountain-chains, or river-courses, with the localities and names of the principal towns.

96. Candidates who aim at the highest class of certificate should be also prepared to answer such questions upon Geography, in its relation to the Physical Sciences and the History of Mankind, as involve a general acquaintance with the subject of climate, the laws of Meteorology, the Distribution of Plants and Animals over the Globe, the leading outlines of Geology, the Ethnographic Division of the Human Race, and the commercial resources of different lands. This kind of knowledge is looked for, not in place of geographical knowledge of a more elementary kind, but as supplementary to it, and throughout based upon it.

97. Text Books:—Manual of Geography, by William Hughes (*Longmans*). Geography of British History, by William Hughes (*Longmans*). Guyot's Earth and Man (*Longmans*). Page's Introductory Text Book of Geology (*Blackwood*). The School Physical Atlas (*either Johnstone's, Phillips's, or that published by the National Society*).

98. The Examiner, speaking of last year's work, says:—"It cannot be too strongly impressed on intending candidates, that methodised study (as distinguished from merely desultory snatches at knowledge) is a condition indispensable to a high order of success."

XXII.—English History.

Examiner.—The Rev. J. S. Brewer, M.A., Professor of Modern History in King's College, London.

99. English History and English Constitutional History.

100. Text Books:—Manual of English History, by Ross; or The Student's Hume. Creasy's English Constitution.

101. Special subject:—The Reign of Charles II. Lingard.

XXIII.—English Literature.

Examiner.—Rev. Samuel Clark, M.A., *Chairman of the Board of Examiners.*

102. Any two, but not more than two, of the authors in the following list may be taken up for examination:—Shakspeare—King Lear; King John; The Merchant of Venice. Chaucer—The Prologue; The Knight's Tale. Bacon—The Essays. Craik—Outlines of the History of the English Language.

103. Candidates are recommended to make a very careful study of the text of the authors they may select. The questions on each author will be divided into two sections, the first intended to test the candidate's acquaintance with the text, the second his knowledge of the subject matter, and his critical and literary information. Full marks will not be given for answers in the second section if those in the first section do not prove satisfactory. No marks will be given for anything beyond answers to the questions.

104. The Examiner, in speaking of last year's work, says:—"I regret to observe that, in spite of the repeated admonitions that have been given, there are some candidates who waste their time by copying out the questions on their papers."

XXIV.—Logic and Mental Science.

Examiner.—J. D. Morell, Esq., LL.D., and one of Her Majesty' Inspectors of Schools.

105. Logic: Candidates will be expected to answer

* The use of symbols and equivalents will be optional.

† A limited number of copies of the 3rd edition are on sale at Messrs. Wildy and Son's, law booksellers, Lincoln's-inn-gateway, Carey-street, price £1 each.

questions on the different processes of thought, and the symbols by which they are expressed. Every candidate must be prepared to analyse examples of reasoning, and to detect fallacies.

106. Text Books:—Whateley's Elements of Logic, or Morell's Handbook of Logic.

107. A Candidate for a second or third-class Certificate will be expected to prepare, in addition, any one of the following books which he may select:—Mill's System of Logic, Book III., Of Induction; Dugald Stewart's Outlines of Moral Philosophy (McCosh's Edition); or Sir William Hamilton's Lectures on Metaphysics, Lectures xx. to xl.

108. A Candidate for a first-class Certificate will be expected to prepare any two of these works which he may select.

XXV.—Latin and Roman History.

Examiner.—Rev. F. Temple, D.D., Head Master of Rugby School.

109. Cicero; De Nat. Deorum Lib. 1. Ovid Metam. Lib. 1.

110. Roman History to the death of Augustus Cæsar. Text Book:—Liddell's History of Rome, in one volume.

XXVI.—French.

Examiner.—Alphonse Mariette, Esq., M.A., Professor of French, King's College, London.

111. The Examination Paper will be divided into three parts.

112. The first will comprise grammatical questions and an extract from a modern French writer, to be translated into English. Candidates merely aiming at a 3rd class certificate should confine themselves to this first part.

113. The second part will comprise, together with a few grammatical questions, an English extract to be translated into French, and a list of idiomatic expressions to be rendered from French into English, or *vice versa*. This should be done satisfactorily by the Candidate who aims at a 2nd class certificate.

114. In the third part, Candidates for a 1st class certificate will have to translate an English extract into French (to which great importance is attached), and to answer properly (*in French*) some *elementary* questions on the two following subjects:—

1. French literature during the fifteenth century, and first half of the sixteenth.
2. The History of France, from the accession of Charlemagne to the death of Louis IX. (768—1270).

115. Books recommended:—Mariette: Half-Hours of French Translation (*Williams and Norgate*, London and Edinburgh). Nisard: Histoire de la Littérature Française, vol. I. (*Williams and Norgate*), or Demogrot: Histoire de la Littérature Française (*Williams and Norgate*). Duruy: Histoire de France, vol. I. (*Williams and Norgate*).

XXVII.—German.

Examiner.—Dr. Wintzer, Teacher of German in King's College, London.

116. The Examination paper will consist of four sections. The first will contain extracts from the works recommended for reading; the second grammatical questions and idioms; the third English phrases, an extract from an English author (both to be turned into German); and the fourth, questions on a period of the history and literature of Germany (stated in par. 123, below), and a theme to be worked out in German.

117. Each candidate must translate at least one of the extracts in section 1, but Candidates for first-class certificates two, one from prose, the other from poetry. The latter must also translate well from English into German, answer in German a few questions on the literature and history of Germany, and write (in German) a well-expressed essay on a subject which will be announced to them when they come up for examination.

118. Books recommended:—*Schiller's* Abfall der Niederlande (book I.); Marie Stuart (acts I. and II.); *Göethe's* Torquato Tasso (acts I. and II.); *Kohlrausch's* Deutsche Geschichte (sechster Zeitraum; Karl V. bis zum westphälischen Frieden (1520—1648); *Vilmar's* Geschichte der Deutschen National Literatur; Alte Zeit bis zum Ende des sechsten (Lombardischen) Sagenkreises.

XXVIII.—Italian.

Examiner—Signor Pistrucci, Professor of Italian in King's College, London.

119. Candidates for first-class certificates will be required—(1st.) To translate into English passages from some of the principal Italian poets and historians, and to answer the grammatical questions which may be added to those passages. (2nd.) They will also have to translate into Italian an extract from some English author; (3rd.) and turn a few familiar idioms into their equivalents, from Italian into English, and *vice versa*.

120. For second and third-class certificates Candidates will translate into English some selection from Metastasio's drammi, and Foscolo or Manzoni's prose works, and answer a certain number of grammatical questions.

XXIX.—Spanish.

Examiner.—B. B. Aguirre, Esq., Lecturer on Spanish in King's College, London.

121. Candidates for a first-class certificate will have to translate an English passage into Spanish, to render into English or French several idiomatic phrases and to write in Spanish a short essay.

122. Candidates for a second-class certificate will have to translate from English into Spanish, and to answer several questions upon the Spanish verbs.

123. Candidates for a third-class cirtificate will have to translate from Spanish into English, and to answer several grammatical questions.

124. Books recommended:—Spanish Gil Blas; Conquesta de Mejico, por Dn. Jose Morales, Santistevan; Trozos escojidos delos mejores hablistas espanòles, por Dn. Carlos Ochoa; Estudios filolójios, por Dn. Manuel Martinez de Morentin.—Don Quixote translated into English by Charles Jarvis.

XXX.—Freehand Drawing.

Examiner.—F. S. Cary, Esq.

125. In freehand drawing the Candidate will be required to show a practical knowledge of the principles usually applied in the imitation of natural and artificial forms, such as furniture, manufactured articles, ornament, foliage, and the human form.

126. The Examiner, in speaking of last year's work, says:—"The drawings are quite up to the general average, but the candidates have sadly failed in answering the four questions relating to the proportions of the human figure."

XXXI.—Practical Geometry.

Examiner.—Thomas Bradley, Esq., Professor of Geometrical Drawing in King's College, London, and at the Royal Military Academy, Woolwich.

127. Practical Geometry, or Geometrical Drawing, is required by the Mechanic, Engineer, Builder, and all in any way employed in the arts of construction. The Candidates will be examined in Practical Plane Geometry, the construction of right line figures of given areas, and of curved lines required in the arts, &c.; in Practical Solid Geometry, Elementary Problems on the line and plane, in space, and their combinations, the representation by orthographic projection of simple solids from conditions; in the principles of Development as used in the construction of Maps, &c.; and in Elementary Perspective Projection as far as it is required by the Architect.

128. Text Books:—Geometry, Plane, Solid, and Spherical (*Library of Useful Knowledge*) is especially recommended as a work to be studied on Theoretical Geometry. Elements of Geometrical Drawing, published by the

Committee of Council on Education, two parts (*Chapman and Hall*). Hall's Elements of Descriptive Geometry for students in Engineering. Heather's Descriptive Geometry. Also the following French Works:—Elémens de Géométrie Descriptive, par S. F. Lacroix; Traité de Géométrie Descriptive par Lefebure de Fourcy; Nouveau Cours raissonné de Dessin Industriel, par Armengaud, aîné, et Armengaud, jeune, et Amouroux; Bardin's Works on Descriptive Geometry.

129. The Examiner, speaking of last year's work, says that the numerous failures are "the result of the same causes which have been mentioned in previous reports—First, a want of elementary knowledge of practical co-ordinate geometry; and secondly, attempted constructions which the candidates should have felt were beyond their powers."

XXXII.—THEORY OF MUSIC.

Examiner.—John Hullah, Esq.

130. Notation, the modern modes, intervals, time signatures, the stave, transposition, modulation, terms and characters in common use.

131. The Elements of Harmony.

132. Musical History and Biography.

133. Arrangements must be made, in the Previous Examinations by the Local Boards, to test Candidates, by oral examination, in their knowledge or appreciation of the *sound* of musical successions and combinations. A form of the test to be used for this purpose by the Local Board at the Previous Examination, will be sent by the Council to such Local Boards as may *apply for it* in due time before the Previous Examination.

PRIZES FOR 1868.

THE PRINCE CONSORT'S PRIZE.

134. His Royal Highness, the late President of the Society, was pleased to offer annually to the candidate who, obtaining a certificate of the first-class in the current year, shall have obtained, in that year and the three years immediately preceding it, the greatest number of such certificates, a PRIZE of TWENTY-FIVE GUINEAS, and this Prize Her Majesty the Queen has graciously intimated her intention to continue. This Prize cannot be taken more than once by the same candidate. It will be accompanied by a certificate from the Society of Arts, setting forth the special character of the Prize, and the various certificates for which it was granted.

GENERAL PRIZES.

*** *None of these Prizes will be awarded to a Candidate who does not obtain a Certificate of the First-class in the subject.*

1. Arithmetic (F)	First Prize, £5. Second Prize, £3.
2. Book-keeping (F)	First Prize, £5. Second Prize, £3.
3. Algebra	First Prize, £5. Second Prize, £3.
4. Geometry	First Prize, £5. Second Prize, £3.
5. Mensuration	First Prize, £5. Second Prize, £3.
6. Trigonometry	First Prize, £5. Second Prize, £3.
7. Conic Sections	First Prize, £5. Second Prize, £3.
8. Navigation and Nautical Astronomy	First Prize, £5. Second Prize, £3.
9. Principles of Mechanics	First Prize, £5. Second Prize, £3.
10. Practical Mechanics	First Prize, £5. Second Prize, £3.
11. Electricity and Magnetism	First Prize, £5. Second Prize, £3.
12. Light and Heat	First Prize, £5. Second Prize, £3.
13. Chemistry	First Prize, £5. Second Prize, £3.
14. Mining and Metallurgy	First Prize, £5. Second Prize, £3.
15.*Botany	First Prize, £5. Second Prize, £3.
16.*Floriculture	First Prize, £5. Second Prire, £3.
17.*Fruit and Vegetable Culture	First Prize, £5. Second Prize, £3.
18. Animal Physiology in relation to Health (F)	First Prize, £5. Second Prize, £3.
19.*Domestic Economy (F)	First Prize, £5. Second Prize, £3.
20.*Political and Social Economy (F)	First Prize, £5. Second Prize, £3.
21.*Geography (F)	First Prize, £5. Second Prize, £3.
22. English History (F)	First Prize, £5. Second Prize, £3.
23. English Literature (F)	First Prize, £5. Second Prize, £3.
24. Logic and Mental Science	First Prize, £5. Second Prize, £3.
25. Latin and Roman History	First Prize, £5. Second Prize, £3.
26. French (F)	First Prize, £5. Second Prize, £3.
27. German (F)	First Prize, £5. Second Prize, £3.
28. Italian (F)	First Prize, £5. Second Prize, £3.
29. Spanish (F)	First Prize, £5. Second Prize, £3.
30. Freehand Drawing (F)	First Prize, £5. Second Prize, £3.
31. Geometrical Drawing (F)	First Prize, £5. Second Prize, £3.
32. Theory of Music (F)	First Prize, £5. Second Prize, £3.

SPECIAL PRIZES.

135. The whole of the General Prizes are offered to female candidates on the same terms as to male candidates; and, in each of the subjects marked F, an additional prize of £2 is offered by the Society of Arts to the *female* candidate who gets the highest number of marks with a certificate of the first-class. This special prize may be taken with, or apart from, any other prize.

136. In addition to the First and Second Prizes in Political and Social Economy offered by the Society of Arts, Mr. Harry Chester, a vice-President of the Society, offers a Third Prize of £2, and three prizes of books value £1 each, to candidates taking First-class Certificates in that subject.

137. In addition to the First and Second Prizes in Domestic Economy offered by the Society of Arts, Mr. Thomas Twining, a vice-President of the Society, offers a Third Prize of £2, and three prizes of books value £1 each, to candidates taking First-class Certificates in that subject.

138. In addition to the Prizes in Geography, offered by the Society of Arts to candidates taking Certificates of the First-class, the President and Council of the Royal Geographical Society offer an additional prize of £5 to the candidate who, taking any grade of certificate in Geography, shall obtain the highest number of marks in that subject.

139. In addition to the Prizes in Botany, in Floriculture, and in Fruit and Vegetable Culture offered by the Society of Arts to Candidates taking Certificates of the First Class, the Council of the Royal Horticultural Society offers three additional Prizes of £5, £3, and £1 respectively to the three Candidates who, taking any grade of Certificate in Botany, obtain the highest number of marks in that subject; also two additional Prizes of £5 and £3 respectively, to the two Candidates who, taking any grade of Certificate in Floriculture, obtain the highest number of marks in that subject; also two additional Prizes of £5 and £3 respectively to the two Candidates who, taking any grade of Certificate in Fruit and Vegetable Culture, obtain the highest number of marks in that subject. These Prizes are offered only to Candidates who are *bonâ fide* professional gardeners.

140. In addition to the Prizes in Floriculture, and in Fruit and Vegetable Culture, offered by the Society of Arts to Candidates taking Certificates of the First Class, the Proprietors of the *Gardener's Chronicle* offer three additional Prizes of £3, £2, and £1 respectively, to the three Candidates, being *bonâ fide* professional gardeners, who, obtaining a Second-class Certificate, at least, in Floriculture or Fruit and Vegetable Culture, shall obtain the highest number of marks in one of these subjects, and also a Second-class Certificate, at least, in Book-keeping or Mensuration.

** The Council have made applications to other Societies and to some of the City Companies, in reference to the offer of other Special Prizes. These applications are under consideration, and the Council have every reason to hope that they will be regarded favourably, but they have thought it undesirable to delay the issue of the programme until replies could be received. Notice will be given in the *Journal of the Society of Arts* (a copy of which is sent to each Institution in Union with the Society) of any additional Special Prizes that may be offered.

*** At the Annual Conference in 1867 it was recommended that, in addition to the Prizes open to Candidates in all parts of the country, each of the District Unions should establish Local Prizes for the Candidates within its own district, and the Society of Arts was asked to assist in the establishment of such Local Prizes. In any instance in which this proposal may be carried into effect, each District Union will announce its own Local Prizes.

LOCAL EDUCATIONAL BOARDS.

The following is a List of the places at which Local Boards have already been formed, with the names of the Secretaries, from whom intending Candidates and others may obtain information relative to the Examinations:—

Local Boards.	Secretaries.
Aberdeen	Mr. Jas. Sinclair, Mechanics' Institution, Aberdeen.
Accrington	Mr. W. Ratcliffe.
Acomb, near York	Mr. T. Copley, Acomb.
Alderley Edge	Mr. G. W. Railton, Alderley Edge Institute.
Aldershot and Farnham District	Mr. Barrow Rule, M.C.P., Principal of the Classical and Mathematical School, Aldershot.
Alton	Mr. J. Bryant.
Ashford	Mr. T. Nesbit, 3, Dover-place, Ashford.
Ashton-under-Lyne	Mr. D. F. Howorth, Mechanics' Institute.
Bacup	Mr. Thomas Newbigging, Bacup Mechanics' Institute.
Banbridge (Ireland) Literary and Mutual Improvement Society	Mr. E. E. O'Neill.

* For extra prizes in these subjects see paragraphs 136, 137, 138, 139, and 140.

Banbury	Mr. John H. Beale, Banbury.
Beeston (Leeds)	Mr. W. Standeven.
Belfast Literary Institute	Mr. F. A. Maitland.
„ Science School	Mr. James McNeill.
Bessbrook (Newry)	Mr. Wm. J. Wonfor, Bessbrook.
Bilston	Hon. and Rev. A. Anson, St. Leonards', Bilston.
Birmingham and Midland Institute	Mr. Edwin Smith, Institute, Birmingham.
Bishop's Stortford	Mr. F. Woodham Nash, B.A., Sion House, Birchanger, Bishop's Stortford.
Blackburn	Mr. W. G. Prebble.
Blandford	Mr. J. B. Green, architect, &c., Salisbury-street, Blandford.
Bodmin	Mr. Josias Phillips, Little Berry-cottage, Bodmin.
Bollington	Mr. J. Gask, Useful Knowledge Society.
Bolton Mechanics' Institution	Mr. Joseph Barton, Mechanics' Institution.
„ School of Science and Art	Rev. Joseph Lowe, M.A., Manchester-road, Bolton.
Bradford	Mr. J. Holbrey, Mechanics' Institution, Bradford.
Brighton (for Sussex)	Mr. Barclay Phillips, 75, Lansdowne-place, Brighton.
Bristol	Mr. R. W. C. Ross, Athenæum, Bristol.
Bromley (Kent)	Mr. W. W. Baxter, Literary Institute.
Burnley	Mr. J. H. Scott, Mechanics' Institute.
Burrage road (Plumstead) Evening Classes	Mr. Josiah Hammond.
Bury (Lancashire)	Mr. T. W. Probert, Manchester-road, Bury.
Bury St. Edmund's	Mr. John Jackson, Head Master of the Commercial School, Bury St. Edmund's.
Calverley (Leeds)	Mr. Alfred Walton
Canterbury	Mr. W. D. Furley, Canterbury.
Carlisle (Mechanics' Institute)	Mrs. Jane Williamson, Mechanics' Institute, Carlisle.
„ (Working Men's Reading Room)	Mr. J. Short, Lord-street School.
Chatham, Rochester, Strood, and Brompton	Mr. F. Butler, 112, High-street, Chatham.
Chelmsford	Mr. W. Cutts and Mr. Jesse Garrood, Chelmsford.
Chorley (Lancashire)	Mr. T. Gillett, Mechanics' Institute.
Christchurch	Mr. W. Judd, F.C.S., High-street.
Clitheroe	Mr. J. Gornall, Moor-lane, Clitheroe.
Congleton	Mr. G. Pickford, Mechanics' Institution.
Cradley	Rev. J. H. Thompson, Cradley, Brierley-hill.
Crewe	Mr. W. C. Cubbons, Mechanics' Institute, Crewe.
Darwen	Mr. A. Bradbury, Mechanics' Inst.
Dean Mills	Mr. W. Taylor.
Deptford	Mr. T. Earland, 2, Wellington-grove, Greenwich-rd., S.E.
Derby	Mr. H. M. Holmes, Hon. Local Sec. to the Society of Arts, London-road, Derby.
Devonport	Mr. W. Mogg and Mr. Samuel Chapple, Mechanics' Institute, Devonport.
Droylsden	Mr. James Blackburn, Educational Institute.
Dudley	Mr. Smith, Mechanics' Institute.
East Lancashire Union of Mechanics' Institutions, Burnley	Mr. John Sutherland, Post-office, Burnley.
Eccleshill	Mr. J. T. Baxter, Eccleshill Mech. Inst.
Edinburgh, Watt Institute and School of Art	Mr. F. W. Bedford, D.C.L., Heriot's Hospital, Edinburgh.
Farsley, near Leeds	Mr. Arthur Kirk.
Faversham	Mr. Frederick W. Monk, Managing Director of the Faversham Institute.
Freetown (Glossop)	Mr. Thomas Haigh, Charlestown-road, Glossop.
Galgate	Mr. Wm. Parkinson, Railway-cottage, Galgate, Lancaster.
Garforth (Leeds)	Mr. Arthur Woodhead.
Gilford (Ireland) Young Men's Mutual Improvement Society	Dr. Henry McBride, M.D., Gilford, County Down, Ireland.
Glasgow Athenæum	Mr. John Allan, 13, Queen-street, Glasgow.
„ Institution	Mr. John Craig, F.E.I.S., Glasgow Institute, 280, George-street, Glasgow.
„ Mechanics' Institution	Mr. J. K. Dempster, Mechanics' Institution, Glasgow.
„ Popular Evening Classes, Andersonian University	Mr. Geo. Martin, 11, Great Western-road, Glasgow.
Guisboro' (Yorkshire)	Mr. T. Webster, Mechanics' Institution.
Halifax Mechanics' Institution	Mr. A. C. Foster, Mechanics' Institution, Halifax.
„ Working Men's College	Mr. Geo. Gibb, Haley-hill, Halifax.
Handsworth	Rev. H. R. Peel.
Haslingden	Dr. J. Binns.
Hastings and St. Leonard's	Mr. J. Savery, 27, Marina, St. Leonard's.
Haughton Dale	Mr. J. F. Fallows, Haughton Dale Works, Denton, Manchester.
Hebden Bridge	Rev. W. Baldwin, M.A., Hebden-bridge.
Hertford	Mr. J. L. Foster, and Rev. J. Davey, Hales's Grammar School, Hertford.
Heywood	Mr. G. Fairbrother, Mechanics' Inst., Heywood.
Holbeck (Leeds)	Mr. Geo. Tinker.
Huddersfield	Mr. Joseph Bate, Mechanics' Institution, Huddersfield.
Hull	Mr. P. Blackmore, 2, Charlotte-street, Hull.
Hulme (Working Men's Institute)	Mr. G. T. Letch, Working-Men's Institute, City-road, Hulme.
Hunslet (Leeds)	Mr. W. Child, Powell-street, Hunslet.
Hyde	Mr. W. Gee, Mechanics' Institute, Hyde.
Ipswich	Mr. Edwin Barrett, 31, Cornhill, and Mr. Herbert Wright, Mechanics' Institution, Ipswich.
Keighley	Mr. C. D. Hardcastle, Keighley.
King's Lynn	Mr. T. Burton, Checker-street.

Kinver	Mr. T. Bolton, Hyde House, Stourbridge.
Lancashire and Cheshire Union of Institutes (Central Board)	Mr. Thomas Lawton, 3, St. James's-chambers, South King-street, Manchester.
Lancaster	Mr. J. Liddell, the Castle, Lancaster.
Leeds, Church Institute	Rev. J. F. Wood.
„ Mechanics' Institution	Mr. J. O. Dayson.
„ Young Men's Christian Association	Mr. W. H. Smith, Y.M. Christian Assoc., Leeds.
Lichfield	Rev. Thomas Dainty, Lichfield.
Liverpool Institute	Mr. Charles Sharpe, the Institute, Liverpool.
Lomeshaye Even. School	Mr. Leonard Clement.
London, City of London College	Mr. W. H. Hansen, City of London College, Leadenhall-street, E.C.
„ Royal Polytechnic Institution Classes	Mr. James Cousens, Royal Polytechnic Institution.
„ St. Stephen's, Westminster	Mr. J. Cawood, St. Stephen's School, Westminster.
„ Metropolitan Association	Mr. W. G. Larkins, 19, John-street, Adelphi, W.C.
„ Bayswater	Mr. C. Baker, 15, St. Petersburg-place, Bayswater, W.
„ Hackney	Mr. H. Gray, Working Men's Inst., Triangle, Hackney, N.E.
„ Lambeth	Mr. T. Heller, Hercules'-buildings, Lambeth, S.
„ Birkbeck Literary and Scientific Institution	Mr. G. M. Norris, 29, Southampton - buildings, Chancery-lane, W.C.
„ Notting-hill	Mr. T. Timson, James-street, Notting-hill, W.
„ Paddington	Mr. P. Vernon Smith, 55, Gloucester-place, Hyde-park.
„ St. George's, Westminster	Rev. P. S. Duval, 7, Panton-square, W., and Mr. G. Pickett.
„ St. Margaret's and St. John's	Mr. V. Borradaile, St. Mary's Parsonage, Vincent-square, S.W.
„ St. Thomas, Charterhouse Evening Classes	Mr. G. Phillipson, St. Thomas' Charterhouse School, E.C.
„ Spitalfields and Bethnal - green	Mr. T. N. Day, Abbey-street School, Bethnal-green, N.E.
„ Stepney Deanery	Rev. J. R. Holmes, 10, Montague-place, Poplar, E.
Louth	Mr. Benjamin Crow, Mechanics' Institution, Louth.
Macclesfield	Mr. W. Jeffery, Park-green, Macclesfield.
Manchester M.I.	Mr. A. Jarrett, 25, Sagar-street, Strangeways, Manchester.
Marple	Mr. W. Walmsley, Hollin's Mill, Marple, Manchester.
Middlesbro'-on-Tees	Mr. W. Taylor, Mechanics' Inst., Middlesbro'-on-Tees.
Mossley	Mr. Thomas Jackson, Mech. Inst., Mossley, near Manchester.
Newcastle - on - Tyne Church of England Institute	Mr. M. J. Foster, Maple-terrace, Newcastle-on-Tyne.
New Mills, near (Stockport	Mr. John Haslam, Working Men's Institute.
New Swindon	Mr. W. L. Fallows, Mech. Inst.
Newton Heath, by Manchester	Mr. S. L. Chadwick.
Oldbury	Rev. H. B. Bowlby, Oldbury.
Oldham Lyceum	Mr. G. B. Taylor.
Ossett (Wakefield)	Mr. J. W. Greenwood.
Padiham, Church of England Evening School	Rev. P. Warburton.
Paisley	Mr. Charles Dalton Wason, St. George's School, Paisley.
Patricroft (Manchester)	Mr. J. W. Robertson, Mech. Institution.
Pembroke Dock	Mr. T. H. Eastlake, 9, Pembroke-street, Pembroke Dock.
Pendleton	Mr. J. Harrop, Mechanics' Institution.
Plymouth, Wesleyan Institute	Mr. J. H. M. Cawse.
Poole	Mr. John J. Norton, West-street, Poole.
Portsmouth	Mr. A. R. Robinson, 198, Lake road, Landport.
Preston	Mr. James Dunn, Avenham Institute, Preston.
Queensbury (Halifax)	Mr. J. W. Quarmby.
Ramsbottom	Mr. R. Barlow, Public Institute, Ramsbottom, near Bury, (Lanc.).
Rawtenstall	Mr. W. Kemp, Mechanics' Institute.
Reeth	Mr. W. Wilkie, Reeth, Richmond (Yorkshire).
Richmond (Surrey)	Rev. W. Bashall, A.M., 3, Cambridge - villas, Park-road, Richmond, S.W.
Rotherham	Mr. W. Unwin, Rotherham.
Rugby	Mr. F. E. Kitchener, M.A.
Rusholme, Public Hall and Library	Mr. E. Wilde.
St. Helen's (Lancashire)	Mr. W. B. Stubbs, 20, Baldwin-street, St. Helen's
Salford	Mr. J. Plant, F.G.S., Working Men's College, Salford.
Scarborough	Messrs. Thos. Shields and C. H. Moxey, Mechanics' Inst.
Slaidburn (Clitheroe)	Mr. T. D. Jackson, Slaidburn.
Slough	Mr. James Chapman, Upton-grove, Slough.
Smethwick	Mr. F. Talbot, Messrs. Chance's Library, Smethwick.
South Staffordshire Educational Association	Mr. F. Talbot, Messrs. Chance's Library, Smethwick.
Southampton	Mr. W. Johnson, Caprera Cottage, Bevois Mount, Southampton.
Southern Countries Adult Education Society	Rev. J. Monkhouse, Oakley, Basingstoke.
Southport	Mr. M. Shepherd, Athenæum, Southport
Staleybridge	Mr. J. W. Wood, Mech. Inst., Staleybridge.
Stockport	Mr. S. Robinson, Mech. Inst.
Stocksbridge (Sheffield)	Rev. H. Robertshaw, Stocksbridge.
Stockton-on-Tees	Mr. T. W. Hornsby
Stourbridge	Rev. H. Sherrard, Stourbridge.
„ Church of England Inst.	Mr. G. Boden
Thirsk	Mr. R. D. Carter, Thirsk.
Tottington (Bury)	Mr. J. Kenyon, Tottington Institute.
Turton	Mr. Thomas Haworth, Victoria Mill, Chapel Town, Bolton.

Wakefield	Mr. W. Ash, Mechanics' Institution, Wakefield.
Walsall	Rev. J. Bradley, Walsall.
Waterford	Mr. James Budd, 5, King-street, Waterford.
Wednesbury	Mr. C. Britten, Market-place.
Wellingborough	Mr. Thomas S. Curtis, Wellingborough.
Werneth (Oldham)	Mr. F. H. Chadderton, Mechanics' Institute, Werneth.
West Bromwich (1)	Rev. F. P. Hutton, Gold's Hill, West Bromwich.
West Bromwich (2)	Rev. J. Whewell, West Bromwich.
West Hartlepool	Mr. C. T. Casebourne, C.E.
West Riding (Yorkshire), Educational Board	Mr. H. H. Sales, Mechanics' Institution, Leeds.
Whitby	Mr. W. G. Chiesman.
Willenhall	Mr. J. C. Tildesley, Willenhall.
Wilsden (near Bingley, Leeds)	Mr. C. Petty, Wilsden.
Wolverhampton (1)	Mr. J. N. Langley, Mowbray House, Wolverhampton.
Wolverhampton (2)	Mr. George Bidlake.
Woolwich Arsenal	Mr. W. D. Keeble, Royal Laboratory, Woolwich.
„ St. Thomas' Parochial Schools	Mr. J. H. Norman.
Worcestershire Union of Educational Institutes	Mr. F. Marcus, Worcester.
York	Mr. R. Hall, 8, Feasgate, York

ELEMENTARY EXAMINATIONS.

The Society of Arts, ever since the establishment of its system of Examinations, has (while abstaining on its own part from examining students in elementary subjects) recommended the District Unions and Local Boards in connection with it to hold Examinations of this character, as preparatory to the Final Examinations of the Society. In order to aid them in doing this, and at the same time to promote, as far as possible, a uniformity of standard all over the country, the following definite scheme of elementary examinations is recommended for the use of the District Unions and Local Boards. It is in two grades, and the candidates should be allowed to select either grade at their discretion.

Lower Grade.

1. Every candidate must be examined in the first four rules of Arithmetic, simple and compound.
2. Female candidates must also be examined in plain needlework.
3. Male candidates must also be examined in *one* at least of the three following subjects:—

A. A General knowledge of the Gospel History.
B. The rudiments of English History.
C. The rudiments of the Geography of England.

4. Fairly good writing and spelling, with good reading of a simple narrative will also be required.
5. A satisfactory examination will entitle the candidate to a certificate (of the Lower Grade) from the District Union or Local Board.

Higher Grade.

1. Every candidate must be examined in Arithmetic, including the Rule of Three. Decimal and Vulgar Fractions.
2. Every female candidate must also show proficiency in needlework.
3. Male candidates must also be examined in *one* at least of the four following subjects:—

A. The facts of St. Luke's Gospel and the Acts of the Apostles.
B. A General knowledge of English History, and especially of the reign of James I.
C. The Geography of Great Britain and Ireland.
D. English Grammar.

4. Candidates will be expected to write fairly, spell correctly, and express themselves grammatically.
5. A satisfactory examination will entitle the candidate to a certificate (of the Higher Grade) from the District Union or Local Board.

No candidates under 12 years of age should be admitted to either grade of these examinations.

The Secretary of any District Union or Local Board in connection with the Society of Arts, desiring to adopt this scheme of Elementary Examinations, must apply to the Secretary of the Society of Arts before the 10*th of February*, stating the number of *male* and *female* Candidates respectively desiring to be examined in *each grade*. Examination Papers* in the above subjects will then be forwarded to him, which of course must be kept secret from the Candidates until the time of the Examinations,

These Examinations must, in 1868, be held on the 10th, 11th, and 12th March, after four o'clock, p.m., as follows:—

Tuesday, 10th March, After 4 p.m.	Wednesday, 11th March, After 4 p.m.	Thursday, 12th March, After 4 p.m.
Arithmetic.	English History. Geography.	Gospel History. English Grammar.

The District Unions and local Boards will understand that they or their own Examiners must look through the Candidates' answers, and award the certificates. When this has been done, a return in the following form must be made to the Secretary of the Society of Arts, who will then forward the proper number of blank Forms of Certificate to be filled up by the Local Board:—

Elementary Examinations, 1868.

Name of Board or District Union. _____

No. of Centres_____

	Higher Grade.		Lower Grade.	
	Examined.	Passed.	Examined.	Passed.
Males				
Females				
Totals				

Any Candidate who has obtained a certificate of the Higher or Lower Grade in these Preparatory Examinations in Elementary Subjects may, at the discretion of the Local Boards, if not less than sixteen years of age, be "passed" to the Final Examination of the Society of Arts in any of the special subjects in which his or her knowledge has also been properly tested.

* The uniform Examination Papers afford a common standard of examination; and, to promote uniformity in the application of that standard, special copies of the examination papers, with the number of marks to be awarded for a complete answer to each question, will be printed for the use of the local examiners. Thus, suppose that in a paper there are twelve questions, and that the aggregate number of marks assigned to the paper is 120; the number of marks placed opposite to each of the questions will depend upon their relative difficulty, and the proportion of these marks given by the examiner for the answer of any candidate will depend upon its accuracy and completeness. Supposing a perfect answer to a question to be set down as worth 20 marks, an examiner may award 20, 15, 12, or any less number, according to the merit of the answer. Thus the candidates all over the country, though their papers be tested by different examiners, will be placed as nearly as possible upon an equal footing. No candidate should receive a certificate who does not obtain at least 30 marks in *each* paper, the whole paper being worth 120 marks. It is desirable that the same person should examine *all* the candidates in any one subject at any centre.

The Council of the Society of Arts, while desiring thus to aid local bodies in promoting elementary education, hope they will prevent the possibility of the elementary certificates awarded by themselves being confounded with the certificates awarded by the Society of Arts.

The foregoing Programme of Examinations is published in a separate form, and may be had *gratis* on application to the Secretary of the Society of Arts.

PUBLIC KITCHENS IN PARIS.

In Paris, as in London, public kitchens have been established by philanthropic societies with variable success, but during the early part of the present year the system of providing cheap and good nourishment for all who desired to avail themselves of such advantages has been tried on a large and well-regulated plan by the order of the Emperor. The Prefect of Police, to whom the experiment has been entrusted, has just made his report to the Emperor, and this document contains much valuable information for the authorities and benevolent associations of all large cities, and, in fact, for all who feel an interest in the working and poorer classes.

The establishments to which the report refers are known as the *Fourneaux Economiques du Prince Impérial;* they are eight in number, and located in seven of the poorer arrondissements of Paris. They were open generally from the first of January to the end of May, embracing, on an average, a season of 117 days. The sales amounted to 1,244,756 portions, namely:—

	Portions.
Meat	166,347
Soup	248,881
Vegetables (dry, principally haricot beans)	267,514
Rice	46,145
Potatoes	5,394
Bread	510,565

The loss in consequence of atmospheric influences is stated at only 3,831 portions, which says much for the care of the Sisters who had charge of the establishments. The actual average cost of these portions of food is stated to have been $\frac{7}{10}$ of a penny, to which has to be added rather more than $1\frac{1}{2}$ centime, or less than half a farthing, for the cost of administration. The 510,565 portions of bread cost 28,950 fr. 85 c., and sold for 25,528 fr. 25 c., showing a loss of about a farthing per lb.

The account for the season stands thus:—

	fr.	c.
Rent of eight establishments	6,320	0
Repairs and arrangement	1,148	62
Furniture and fittings	18,689	27
Expenses of the staff, including the Sisters and their assistants	3,955	50
Outlay for bread	28,950	85
,, meat	30,498	70
,, vegetables and rice	13,296	10
Fuel	2,430	90
Sundry expenses	5,334	34
	110,624	28
Amount of receipts for viands sold	62,237	80
Leaving a debit of £1,935 8s. 10d., or	48,386	48

But against this there remains on hand the whole of the stoves and other apparatus for future operations, so that the cost of the campaign must be estimated as follows:—

	fr.	fr.
		58,386
Less cost of material	18,689	
Deducting say 10 per cent. for wear and tear	1,868	
		16,821
		31,565

or about £1,263 for the eight kitchens in operation during five months.

The influx of applicants was beyond the means of the establishments, and did not fall off to the last moment of the season, and it was found that without causing a loss of time, which to the working classes is of course of the utmost importance, each kitchen could only meet an average demand of 1,000 or 1,200 portions per day.

The customers are classified by the Prefect under two heads—women or children who purchased provision for their families, and working men who took their morning meal at the kitchen; the latter class amounted in some establishments to four or five hundred per day, the Sisters doing all in their power to prevent loss of time to their visitors.

A fear was entertained, it is stated in the report, that the workman would soon become tired of a diet in which there was scarcely any variety, but this is stated not to have been the case, and the visitors were almost always the same; this is attributed, and with great probability, to the great care exercised in the cooking, which rendered the dishes always palatable. The hope is entertained, moreover, that those who for five months were well satisfied with plain but highly nutritious viands, will not again recur to other and less economical food, and on this point, and also as regards the cost of the victuals sold, we find the following passage:—"It is impossible that the visitors should not have been struck with the fact that with two litres of soup costing two pence, a pound of meat sold for three pence, and about three litres of vegetables, also costing three pence, or eight pence in all, it was possible to feed a family of four or five persons." Even supposing that circumstances should cause these prices to be doubled, it is argued it would be advantageous to continue these kitchens, not only as a welcome aid to the working classes in inclement seasons, but as a valuable lesson in economy, as the working classes would thus learn that by co-operation they could produce the same effect for themselves.

As regards the collateral effects of these establishments, the Prefect says that it was ascertained that the regular frequenters of the kitchens were enabled, through the reduced cost of their meals, to provide themselves with warmer clothes for the winter season, to redeem their pledges from the *mont de piété*, to pay off debts, and that the painful scenes which constantly occur when rent becomes due almost entirely ceased in the quarters in which the kitchens were situated.

Fine Arts.

Free Exhibition of Pictures, Paris.—A new exhibition is being organised in Paris by M. Constant Cimetière; the subscription is fixed at the sum of 24 francs yearly, by instalments, and artists may take as many subscriptions as they please, each conferring the right of exhibiting one work of art during the whole year, the artist being allowed to change one picture for another when he pleases. The conditions are—that the works exhibited shall be insured against liabilities as regards rent, &c.; that in case of injury the directors shall repay the artist two-thirds of the value of the work as fixed by himself; that a register containing the names and addresses of the artists, with the numbers and prices of the

works exhibited, shall be open to visitors; that the directors shall make no charge for sales; that artists shall send in their works within one month of the opening day, or of the date of their subscription, or forfeit their claim to a place on the walls; that the price of admission shall be half a franc on week-days, and half that sum on Sundays; that the exhibition shall remain open all the year round; and that each subscribing artist shall have two free passes at his disposal.

The Sainte Chapelle.—The restoration of the beautiful chapel built by Pierre de Montereau, by order of St. Louis, is just terminated; besides the chapel, which is well known to visitors, there is another below, which has hitherto been closed; this is now completely repaired, the walls decorated with paintings, the windows filled in with stained glass, and the floor laid with mortuary stones of the fourteenth and fifteenth century; this chapel will shortly be added to the list of interesting sights in Paris.

Manufactures.

Silk Plant.—The United States consul at Lambayeque, in Peru, has made a communication to his government respecting a plant which yields a fibre closely resembling silk. It is an evergreen shrub, attaining the height of three to four feet, and the silk is contained in a pod, and is said to be superior, both as regards fineness and quality, to that of the silk worm. The young branches of the plant are also said to yield long brilliant fibres, finer and stronger than the best flax. The Indians make from these fibres a cloth, which although coarsely woven, is described as remarkably good. The plant is about to be introduced into the United States on a large scale. The value of this communication would be more apparent if some indication of the species to which the shrub in question belongs were given, and if it were stated whether the silk or cotton from the pods requires to be spun, or will wind like true silk.

New Fibrous Materials.—Much attention is being given in France and elsewhere, at present, to the preparation of fibres from various indigenous and acclimatised plants. M. C. Peyre, a chemist, of Nancy, is said to have produced fibres from the nettle which closely resemble fine hemp, and unbleached fibres of the olive, which, it is believed may, when tanned with the gallic acid from the bark of the same tree, become valuable for sail-making. The treatment of the fibres of the mulberry-tree was attempted by means of caustic lye, for the removal of the woody and gummy portions, but it was soon found that the alkali ruined the fibre; it is now said that M. Peyre has prepared a special solution for the purpose which has not the same mischievous action, but its composition is not revealed. The result is stated, however, to be the production of a supple and brilliant fibre, closely resembling floss silk. Another chemist, M. Lucien Tracol, of Bourg-Argental, is also busy upon the mulberry fibres, and his experiments are said to hold out good prospects of success.

Commerce.

Structure, &c. of Woody Fibres.—M. Payen, the eminent French chemist, has presented an interesting paper to the Academy of Sciences, on the "Structure and Constitution of Woody Fibres," of which the following are the conclusions:—1. The subject of substitutes for textile fibres is one of great interest, and promises a gradual increase in the consumption of paper, which naturally follows the happy impulse given to general education. 2. In a scientific point of view, it is proved by a considerable annual consumption, representing more than one-tenth of the total amount of the raw materials of paper, that the cellulose extracted from various and even from ligneous fibre, more or less covered with other matters, is chemically identical. 3. That the less compact spongy cellulose forming the matter of ligneous incrustations may be detached from the cells by means of acids, which convert it into glucose capable of undergoing alcoholic fermentation. 4. That thus two products may be obtained from the wood of various trees; alcohol, and membrane of cellulose sufficiently strong, flexible, and pure, to be used in making all kinds of paper, and even for the whitest kinds, in the proportion of 80 per cent. 5. That this experimental demonstration is equally interesting in an agricultural point of view, for it opens up a new market for the products of plantations of *coniferæ*, which have the special quality of rendering productive and healthy the immense tracts of waste country which are to be found in France.

Colonies.

Queensland Sugar.—"In a paper read before the Queensland Philosophical Society," says the *Queensland Journal of Commerce*, "it was satisfactorily shown that Queensland could compare favourably with Jamaica in the economical production of sugar. The cultivation in Queensland of one acre of plant canes would cost about £6; the same quantity cultivated in Demerara would cost £6 17s. 6d. The ratoon canes, grown at the latter place, require as much weeding, draining, and shovel-ploughing as plants, thus adding considerably to the cultivation; whereas in Queensland, thrashing only is sufficient, and a saving of 50 per cent. is effected. The climate of Queensland does not induce the rank growth of weeds, so common in other countries, thus reducing the amount of labour necessary, and rendering Queensland a country in which the cultivation of sugar requires less labour than any other sugar-growing country in the world." The same paper also states that "a Maryborough firm is vigorously engaged at their mills in manufacturing sugar from cane grown in that locality. The success which has hitherto attended them considerably exceeds their anticipations. The canes which have been put through their mills had stood beyond the proper time for cutting, and had consequently lost a considerable quantity of saccharine matter; nevertheless, the yield of sugar and molasses is at the rate of £84 4s. per acre of cane. The proprietors of the mills are confident that when fully-matured canes are placed in their hands, the highest prices hitherto obtained will be exceeded. By July, over 100 acres of such canes were probably to be ready for these mills, when it is expected that Maryborough sugar will come into general use."

Notes.

Scholastic Registration Association.—This association proposes to hold an Educational Congress at Birmingham, in the autumn of the present year, for the discussion of certain most important questions. At the last annual meeting it was resolved to make the association the basis of a periodical Educational Congress, which will, no doubt, exercise powerful influence in the country, and tend greatly to advance the highest interests of education, by bringing educators of various classes and opinions into annual conference on questions affecting themselves and, more especially, their profession, and by affording the friends of education the means of exchanging views with those who are practically engaged in the work. The Council of the College

of Preceptors has appointed the following gentlemen to co-operate with the association in making arrangements for holding the proposed Congress:—Dr. Aldom, Rev. Dr. Haig-Brown, Dr. Hodgson, Mr. Payne, Mr. Robson, Mr. Barrow Rule, Dr. Schaible, Rev. Dr. West, Dr. White. Further particulars may be obtained from the hon. sec., Mr. Barrow Rule, Aldershot.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 6th July, 1867.

229. Bill—Barrack-lane, Windsor (Right of Way).
243. The "Elizabeth Buckham"—Correspondence.
383. River Shannon—Report by J. F. Bateman, Esq.
393. Revenue (Scotland)—Statements.
409. Westminster Abbey—Return.
Public Petitions—Thirty-second Report.

Delivered on 8th July, 1867.

225. Bill—County General Assessment (Scotland).
230. ,, Intestates' Widows and Children.
397. Army (Barracks)—Return.
412. Dogs' Registration (Ireland)—Regulations.
413. Sir John Port's Charity Bill—Minutes of Proceedings.
419. Customs Tariffs (Colonies)—Return.
424. New Boroughs—Return.

Delivered on 9th July, 1867.

223. Bill—Guarantee of Public Officers.

Delivered on 10th July, 1867.

228. Bill—Contagious Diseases (Animals) (amended).
231. ,, Game Laws (Scotland) (amended).
232. ,, Turnpike Acts Continuance, &c,
233. ,, Turnpike Trusts Arrangements.
235. ,, Court of Chancery (Officers).
404. Statute Law Commission—Accounts.
420. Terminable Annuities—Treasury Warrant.
Manufactures, Commerce, &c.—Reports by Her Majesty's Secretaries of Embassy and Legation (No. 6).
Oaths—Report of Commissioners.

Patents.

From Commissioners of Patents' Journal, July 12th.

Grants of Provisional Protection.

Air, compressing—1768—I. G. Lloyd.
Albums, photographic—1603—C. E. Brooman.
Anchors for steam ploughs, &c.—1829—J. Surridge.
Animal substances, embalming and preserving—1850—L. Brunetti.
Axles—1859—R. Eadie.
Bedsteads—1811—B. Browne.
Bedsteads and couches—1812—J. Gardner.
Buckets, &c.—1821—F. Reddicliffe.
Buffer stops, &c.—1793—H. C. Hurry.
Buffers—1794—W. MacLellan.
Building materials, hoisting—1855—W. Cooke.
Camera obscura—1676—J. Petrzywalski.
Candles—1836—J. K. Field.
Carding engines, &c., increasing the speed of—1809—W. Robertson and C. J. Waddell.
Carriages, railway—1879—W. R. Lake.
Cartridges—1806—J. W. Cochran.
Castors—1796—J. E. Whiting.
Chairs, easy, &c.—1805—J. Ward and F. Dressler.
Chucks—1801—L. Sterne.
Coal vases, &c.—1786—D. Jones.
Cold, apparatus for producing—1621—R. Reece.
Dies for stamping—1818—W. Price.
Dishes, &c., apparatus for holding and lifting—1782—T. Brown.
Drilling and hoisting machines—1753—G. Allix.
Engines, marine—1839—W. E. Newton.
Engines, rotary, &c.—1791—E. W. Hughes and T. H. Head.
Feed-water regulator, &c.—1824—O. R. Chase.
Filtering apparatus—1860—W. E. Newton.
Fire-arms, breech-loading—1858—J. Human.
Fire-arms, breech-loading—1873—E. Farrington.
Fire-arms, breech-loading—1881—J. R. Cooper.
Fire-escape—1745—J. Quin.
Flyers, tubular—1685—J. Horton.
Fuel, artificial—1713—H. Fletcher.
Fuel, artificial—1830—S. Hall and W. H. Parsons.
Furnaces—1784—W. S. Thomson.
Furnaces—1814—W. Bellhouse.
Games of skill, &c., apparatus for playing—1857—T. Taylor.
Gas—1819—G. Dickie.
Gas—1846—T. Crow.
Gas—1849—A. Aitchison and T. South.
Gas burners—1837—E. P. Gleason.
Hair, artificial—1841—H. Rushton.
Haymaking machines—1842—H. R. J. Denton.
Horses' feet, measuring—1815—A. M. Clark.
Iced beverages—1875—W. E. Newton.
Lamp burners—1838—L. C. F. Clerc.
Looms—1774—D. Sowden and R. C. Stephenson.
Looms—1871—W. Bullough.
Metal pipes, jointing, &c.—1834—T. Rafferty and J. H. Storey.
Motive-power apparatus—1291—H. W. Grylls, H. Neville, J. W. Brooks, and J. Holt.
Motive-power apparatus—1787—F. W. Waide.
Motive-power apparatus—1831—J. L. V. le Marquis de Cosentino.
Motive-power apparatus—1847—J. E. Whiting.
Motive-power engines, &c.—1822—E. McClintock.
Mowing machines—1883—L. B. Elliot.
Nippers—1826—A. M. Clark.
Nuts, securing—1780—R. Bodmer.
Oil, essential—1617—F. W. Dolman.
Ovens—1853—H. Veillon.
Paint, zinc—1845—J. Webster.
Paper linings for casks, &c.—1885—J. H. Viton.
Pumps—1827—S. Holman.
Retorts, charging and emptying—1820—G. Simpson.
Saddlery, &c., sewing—1798—A. M. Clark.
Seats for children—1792—A. L. Panter.
Ships, &c.—1309—E. Leigh.
Ships' signal lights—1840—R. Capper and G. Read.
Signals, &c., railway—1867—J. G. Rowe.
Smoke, consuming—1854—G. Alston.
Smoke, consumiug—1861—R. P. Forlong.
Spanners—1799—T. Wilson.
Springs for doors, windows, &c.—1790—J. Coppard.
Steam engines—1865—A. C. F. Franklin.
Steel, casting Bessemer, &c.—1833—J. Birch.
Steel, manufacturing—1803—H. K. York.
Stills for petroleum, &c.—1808—J. W. Perkins.
Surgical appendages—1843—T. Pebardy.
Telegraphic conductors—1770—M. Gray.
Telegraphic conductors—1772—M. Gray.
Tenon cutting machines—1813—J. Powis and J. S. James.
Tobacco, roll—1869—J. McEwen.
Topsails, reefing and furling—1848—F. Höök.
Type, printing—1722—J. F. Boëtius and J. Eichhorn.
Types, dressing—1776—P. Welch.
Vessels, raising sunken—1778—J. M. Frost.
Vessels, &c., manufacture of hollow—1851—W. T. Watts and D. J. Fleetwood.
Ware, handles for vessels of hollow—1797—D. Jones.
Water tuyeres—1817—B. and T. Ford.
Water tuyeres—1823—J. Onslow and F. Northall.
Water, &c., raising and forcing—1828—T. Wilson and W. Hall.
Weights, raising, &c.—1816—F. C. Hennet and D. Spink.
Wine on draught, improving—1729—T. S. Prideaux.
Wool, &c., preparing—1877—W. Hodgson.
Wool, &c., scouring—1887—C. O. Heyl.
Wrenches—1802—C. Stuart.
Yarns—1795—J. H. Johnson.

Inventions with Complete Specifications Filed.

Cordage, &c., manufacturing—1933—W. R. Lake.
Gas—1967—W. R. Lake.

Patents Sealed.

91. J. Reilly.
105. M. Henry.
107. A. Hill.
108. J. J. E. Robert-Houdin.
113. J. Craven.
115. J. Davies and A. Helwig.
125. C. F. Cooke and J. Standfield.
137. J. Harding.
158. W. A. Martin.
173. J. S. Dronsfield.
230. F. C. Cambrelin.
232. J. Haworth.
235. J. Hopkinson.
262. G. A. J. Schott and J. S. Rosenthal.
364. P. E. Gaiffe and A. A. Lalance.
485. W. West and J. Darlington.

From Commissioners of Patents' Journal, July 16th.

Patents Sealed.

119. E. Süvern.
123. D. Barker.
126. A. Berens.
127. E. J. Smith.
129. C. E. Brooman.
131. J. G. Franklin.
135. R. R. L. Rosoman.
142. A. B. Childs.
143. W. Bull.
144. T. W. Willin.
148. G. L. Loversidge.
149. G. M. Willes.
159. J. Chrétien.
165. H. Bridgewater.
188. G. Haseltine.
193. T. Berney.
206. B. Hunt.
212. J. H. Johnson.
213. T. Berney.
238. J. Ritchie.
245. H. Craven and J. Speeding.
283. H. Ermen.
294. W. Richardson.
316. G. Haseltine.
365. W. Jones.
367. J. Stanton.
453. A. V. Newton.
605. S. Newington.
630. A. V. Newton.
1045. W. R. Lake.
1423. C. Randolph.

Patents on which the Stamp Duty of £50 has been Paid.

1750. J. Gilmour.
1759. A. A. Croll.
1731. S. J. V. Day.
1732. J. Forbes.
1770. J. Saunders.
1817. J. Hart.
1757. T. Boyle.
1766. R. A. Brooman.
1768. J. G. Tongue.
1794. W. M. Cranston.

Journal of the Society of Arts.

FRIDAY, JULY 26, 1867.

Announcements by the Council.

Society's Visit to the Paris Exhibition.

Arrangements have been made for the visit of the members to the Universal Exhibition, 1867, as follows :—

The visit will extend from Monday, the 29th of July, to Friday, the 16th of August.

A Reception Room has been provided for the use of the members at No. 43, Rue Saint Georges, where members can have their letters addressed, where they can write their letters, make appointments and arrangements, and where notices of any special matters connected with the visit will be suspended. Members are requested to register their names and addresses here on their arrival in Paris. Lists of Hotels and Lodgings will be provided.

Arrangements have been made by which the Members of the Society of Arts will, through the kindness of the proprietors, be admitted, on the presentation of their cards of membership, to inspect Imperial and Municipal establishments, factories, and workshops in the following list :—

His Excellency the Minister of Public Instruction has most kindly arranged for the Members visiting the Lycées of Paris, and has also further favoured the Society with tickets to view the exhibition of the works of the pupils in the Communal schools, and of the collections made by the Scientific Commission of Mexico.

The Director of the Imperial Mint (La Monnaie) has given instructions that members of the Society, when provided with their cards, which will be prepared for the purpose, shall be admitted to that establishment on Tuesdays and Fridays, at three o'clock.

The Director of the Imperial Observatory has arranged that the Members presenting their cards of membership at that establishment shall be admitted on Saturdays, between half-past two and four o'clock.

Monsieur le Senateur, Prefect of the Seine, has politely promised to make proper arrangements for the visits of the members to the catacombs, sewers, and municipal establishments.

Through the kindness of M. Belgrand, the water engineer to the City of Paris, permission has been obtained for members to visit the Waterworks of the City of Paris at Menilmontant, on any day to the 5th August inclusive.

The Director of the Public Ways and Promenades of the City of Paris has thrown open the horticultural and other municipal establishments in his department, and has most obligingly tendered his assistance to the members.

M. Le Play, Commissaire-General of the Universal Exhibition, has very kindly expressed his desire to aid the members in any way in his power.

The following gentlemen and companies have politely opened their establishments to the Society :—

MM. J. F. Cail and Cie., engineers, Quai de Billy, No. 48, and Grenelle. Any day of the week, from 6 to 11 a.m., and from 12 to 5.

M. F. Barbedienne has furnished tickets of admission to visit his bronze foundry and workshops, 63, Rue de Lancry, on any day in the week, from 6 a.m. to 5 p.m.

MM. Barbezat and Cie., foundries, 58, Boulevard Prince Eugene, and 95 and 97, Rue Richard-Lenoir. Open to the members without restriction as to the day or hour.

MM. Ch. Christofle and Cie., gold and silversmiths, 56, Rue de Bondy, will receive a party of the members on any day appointed by the Society, between 12 and 2 o'clock.

MM. Hachette and Cie.'s great publishing establishment will be open to members on any day, between half-past 8 and 11 o'clock, by presenting their cards to M. Fouret, a member of the firm.

M. Ch. Lahure, Imprimerie Générale, 9, Rue de Fleurus, on any day and at any hour, except between 12 and 2 o'clock.

MM. A. Chaix and Cie., printing establishment, 20, Rue Bergère, on Friday in each week.

MM. Mazaroz-Ribaillier and Cie., furniture manufacturers, Exhibition rooms, 20, Boulevard des Filles de Calvaire ; manufactory, 4 and 6, Rue Ternaux Popincourt, freely open to the members.

The Directors of the Compagnie du Chemin de Fer de Paris à Orleans have given leave for the members to visit their new passenger station and goods station, on presenting their cards of membership to M. Renault, Chief Architect of the Company, No. 1, Boulevard de l'Hôpital ; or to M. Prevel, 42, Quai de la Gare ; according as they desire to see the passenger station or the goods station.

Mr. W. E. Newton will show the Artisans' Dwellings now being erected for H.I.M. the Emperor, in the Avenue Dumesnil. The days and hours for visiting will be notified at the Reception-rooms.

Nothing could exceed the politeness with which the various gentlemen have met the requests of the Society, and there is no doubt that in a day or two several other establishments will be added to the list.

Cards of membership, enabling members to take advantage of these arrangements, may be obtained on application to the Society's House, John-street, Adelphi, or at 43, Rue Saint Georges, Paris.

P. Le Neve Foster, *Secretary.*

The following list of hotels will be found useful :—

In the neighbourhood of the Tuileries.

Hôtel Meurice, 228, Rue de Rivoli.
„ Windsor, 226, „
„ Brighton, 218, „
„ Wagram, 208, „
„ Rivoli, 202, „
„ du Louvre, 166, „

On or near the principal Boulevards.

Grand Hôtel, 12, Boulevard des Capucines.
Grand Hôtel des Capucines, 37, Boulevard des Capucines.
Hôtel Scribe, 1, Rue Scribe.
„ de Bade, 32, Boulevard des Italiens.
„ du Tibre, 8, Rue du Helder.
„ du Helder, 9, Rue du Helder, Boulevard des Italiens.
„ Brezil, 16, Rue du Helder.
„ de Lancastre, 22, „
„ de l'Amirauté, Rue Neuve Saint Augustin.
„ Choiseul, 7, Rue de Choiseul.
„ des Deux Mondes, 8, Rue d'Antin.
„ des Etats Unis, 16, Rue d'Antin.
„ de la Grande Bretagne, 14, Rue Caumartin.

Rue St. Honoré, &c.

Hôtel de Lille et d'Albion, 223, Rue St. Honoré.
„ St. James, 211, Rue St. Honoré.
„ Choiseul, 241, Rue St. Honoré.
„ du Danube, 11, Rue Richepance.
„ Richepance, 14, Rue Richepance, near the Madeleine.
„ de l'Amirauté, 20, Rue Duphot.

Rue de la Paix, Place Vendôme, &c.

Hôtel de la Paix, 32, Rue de la Paix.
„ Westminster, 11, Rue de la Paix.
„ Mirabeau, 8, „
„ Bristol, 5, Place Vendôme.

Hôtel du Rhin, 4, Place Vendôme.
„ Castiglione, 12, Rue Castiglione.

Palais Royal and Bourse.

Hôtel des Etrangers, 3, Rue Vivienne.
Grand Hôtel de France et d'Angleterre, 72, Rue Richelieu.
Hôtel d'Angleterre, 56, Rue Montmartre.
„ Bergère, 32, Rue Bergère.
Grand Hôtel de la Marine, 3, Rue des Vieux Augustins.
Grand Hôtel d'Albion, 20, Rue Bouloi.
Hôtel Bouloi, 5, Rue Bouloi.
Grand Hôtel de la Bourse, 15, Rue Nôtre Dame des Victoires.

Neighbourhood of the Northern Railway.

Hôtel de Chemin de fer du Nord, opposite the Railway Station.
Grand Hôtel du Nord, 45, Rue Lafayette.
Grand Hôtel de Strasbourg, 78, Boulevard de Strasbourg.
Hôtel Violet, Passage Violet, Faubourg Poissonnière.

Between the Western Railway Station and the Madeleine.

Hôtel des Etrangers, 24, Rue Tronchet.
„ Tronchet, 22, „
„ Folkestone, 9, Rue Castellane.
„ Bedford, 17, Rue de l'Arcade.
„ de l'Arcade, 43, Rue de l'Arcade.
„ Navarin, Rue Navarin.

South Side of the Seine.

Hôtel d'Amsterdam, 59, Rue Saint André des Arts.
„ des Beaux Arts, 1, Rue Beaux Arts.
„ Bretagne, 20, Rue de Seine.
„ „ 46, St. André des Arts.
„ de Breteuil, 1, Rue Dauphin.
„ Clovis, 69, Rue Monsieur le Prince.
„ Suffren, Avenue Suffren, Champ de Mars.

Railways and Steamboats.—The terminus of the Auteuil and Exhibition Railway is at the Western Station, Place du Havre. 2nd class carriages only 50c., intermediate stations 40c. Trains leave the terminus at 27 minutes, and the Exhibition at 25 minutes past each hour; there is an extra up train at 5·57. The Circular Railway (Chemin de fer de Ceinture) has stations all round Paris, and joins the preceding at Auteuil. The large omnibuses of the American Railway run from the Bourse, and carry passengers for the Exhibition to the Pont d'Alma. Steamboats run from the Place de la Concorde every quarter of an hour for the Exhibition. Landing stage on the Paris side of the Pont de Jena. Other steamboats ply between the Champ de Mars and the Ile de Billancourt. Landing stage on the lower side of same bridge.

Numbers of Houses in Streets.—Even Nos. on right side, odd Nos. on left side of street, progressing in direction of the stream of the river, or commencing from the river in transverse streets.

Poste Restante.—Letters addressed "Poste Restante" to be applied for at the head post-office, 9, Rue Jean-Jacques Rousseau; but members can have their letters addressed to No. 43, Rue St. Georges.

Cab Fares in Paris.—Two kinds of cabs—single seat for two; double seat for four.

Fare either by the "hour" or the "course," at the option of the hirer ("course" any distance without stoppage).

Fares—Two-place cab, 2f. per hour; 1·50 f. per course; four-place cab, 2·25 f. per hour; 1·70 f. per course.

Driver's usual gratuity, 5 sous per hour; 3 or 4 sous per course.

Extra charge between 12·30 night and 6 morning.
„ „ when taken from "Remise" (coach-house).
„ „ beyond the fortifications.
„ „ for luggage.

Ticket containing full particulars of authorised charges always to be given by the driver on entering his cab.

Omnibus Fares.—30 centimes (3d.), inside; 15 centimes (1½d.), outside.

Money.—Gold:—20 francs, 10 francs, and 5 francs. Silver:—2 francs, 1 franc, ½ franc, and 20 centimes. Copper:—10 centimes (2 sous) = 1d.; 5 centimes (1 sou) = ½d. £1 = 25 francs, usual exchange.

Artizans' Visit to Paris.

Her Majesty's Government have granted to the Society of Arts, in aid of the fund now being raised by the Society for assisting workmen, specially selected from various trades, to visit and report on the Paris Exhibition, the sum of £500, conditional on the Society raising a like amount by public subscription.

The following is the list of subscriptions up to the present date:—

	£	s.	d.
H.R.H. the Prince of Wales, President	31	10	0
Her Majesty's Government (conditional)	500	0	0
Society of Arts	105	0	0
Earl Granville, K.G.	5	0	0
Lord de L'Isle	10	0	0
Thomas Twining	2	2	0
Sir J. P. Boileau, Bart.	5	0	0
George Godwin, F.R.S.	1	1	0
Vice-Chancellor Sir W. Page Wood, F.R.S.	10	0	0
W. H. Bodkin (Assistant-Judge)	3	3	0
Sir Rowland Hill, K.C.B.	3	3	0
Benjamin Shaw	2	2	0
Alfred Davis	10	10	0
Eugène Rimmel	5	5	0
Frederick Mocatta	2	2	0
James Marshall	2	2	0
Robert Dawbarn	1	0	0
Henry Vaughan	10	10	0
Philip Sancton	5	0	0
Somerset A. Beaumont	5	0	0
Decimus Burton, F.R.S.	1	0	0
W. Botly	1	1	0
Professor Robert Bentley	2	2	0
John Stuart Mill, M.P.	1	1	0
G. F. Wilson, F.R.S.	2	2	0
Henry Creed	1	1	0
The Marquis of Salisbury, K.G.	10	0	0
D. Roberton Blaine	2	2	0
William Hawes	2	2	0
Seymour Teulon	1	1	0
G. N. Hooper	2	2	0
Lord Taunton	5	0	0
Henry Cole, C.B.	1	0	0
A. Robb	1	1	0
S. Andrews	1	1	0
Thomas Dixon	1	1	0
Charles Telford	1	1	0
Edmund Burke	2	0	0
W. H. Gore Langton, M.P.	5	0	0
J. R. Fowler	1	0	0
John Rutson	1	1	0
W. Fothergill Cooke	2	2	0
J. P. Gassiot, F.R.S.	5	5	0
The Duke of Devonshire	10	0	0
Messrs. Chawner and Co.	2	2	0
Chas. Brooke, F.R.S.	1	1	0
T. Chappell	2	2	0
C. Candy	2	0	0
Alfred Haines	2	2	0
Major-General Sir William Gordon, K.C.B.	2	2	0
Bartlett Hooper	2	2	0
F. Richardson	1	1	0
J. Sharples	3	3	0
Henry Johnson	2	2	0
C. Skipper, jun.	1	1	0
G. T. Saul	1	1	0
Carry forward	£803	15	0

Brought forward	803	15	0
Alderman D. H. Stone	5	5	0
G. H. Walker	1	1	0
R. Worthington	2	2	0
A. W. Miles	2	2	0
J. Harris Heal	2	2	0
John Bell	1	0	0
Messrs. Mander and Co.	2	2	0
B. S. Cohen	1	1	0
John Corbett	1	1	0
J. Zaehnsdorf	0	10	6
Major-General Viscount Templetown, C.B.	5	0	0
J. Pearce	3	3	0
Messrs. Huntley and Palmer	2	2	0
A. Glendining, jun.	1	1	0
A. Trevelyan	2	2	0
S. Harrington	1	1	0
Montague Ainslie	2	2	0
James Bentley	2	2	0
Capt. R. P. Oldershaw	1	0	0
E. C. Tufnell	2	2	0
Samuel Redgrave	1	1	0
Joseph Lockett	2	2	0
Messrs. Spicer, Bros.	4	4	0
John Tolhurst	1	1	0
Lord Ebury	5	0	0
C. Lawson	1	0	0
John Horton	1	1	0
W. Baker	1	1	0
Henry Briggs	1	1	0
James Heather	1	1	0
H. Reader Lack	1	1	0
C. Silvy	1	1	0
Collected in response to a Circular issued by the Birmingham Chamber of Commerce.			
G. Dixon, M.P., Birmingham	5	5	0
Messrs. Smith and Wright, Birmingham ..	5	5	0
Messrs. Griffiths and Browett, Birmingham ..	5	5	0
Henry Weiss, Birmingham	2	2	0
W. H. M. Blews, Birmingham	2	2	0
W. Middlemore, J.P., Birmingham	5	5	0
Thomas Lloyd, Birmingham	2	2	0
Messrs. Elkington and Mason, Birmingham ..	5	5	0
Messrs. John Hardman and Co., Birmingham	2	2	0
Messrs. F. and C. Osler, Birmingham ..	5	5	0
The Proprietors of the *Birmingham Journal and Daily Post*	2	2	0
The Proprietors of the *Birmingham Gazette* ..	2	2	0
R. L. Chance, Birmingham	2	2	0
T. Avery, Birmingham	2	2	0
W. Tonks and Sons, Birmingham	2	2	0
W. Lucas Sargant, Birmingham	2	2	0
— Mountain (Messrs. Walter, May, and Co.), Birmingham	2	2	0
J. A. Williams, Birmingham	2	2	0
Henry Charlton, Birmingham	2	2	0
W. Bartlett and Sons, Birmingham	5	0	0
John P. Turner, Birmingham	0	10	6
W. H. Avery, Birmingham	2	2	0
Messrs. Peyton and Peyton, Birmingham ..	3	3	0
James Cartland, Birmingham	2	2	0
Messrs. Smith and Chamberlain, Birmingham	2	2	0
Messrs. Baker and Son, Birmingham ..	2	2	0
Messrs. Hinks and Wells, Birmingham ..	2	2	0
Messrs. Van Wart and Co., Birmingham ..	5	0	0
Messrs. Evans and Askin, Birmingham ..	2	2	0
C. Shaw, Birmingham	2	2	0
James Barwell, Birmingham	1	1	0
Total	£952	15	0

Messrs. J. M. Johnson and Sons have kindly placed at the disposal of the Council a number of their five-shilling English Catalogues of the Exhibition, sufficient to present each workman with a copy.

Subscriptions may be forwarded to the Financial Officer, at the Society's House.

The Council are now prepared to receive the names of any workmen recommended by their respective trades as fit and proper persons to undertake this important duty on behalf of their fellow workmen.

Proceedings of the Society.

Food Committee.

PRESERVATION OF MEAT.

Messrs. Medlock and Bailey have put forth a plan for the preservation of meat, poultry, and fish. It appears, from a printed document issued by those gentlemen, that—

"Something like two hundred patents have been taken out in this country for the 'Preservation of Food,' many of them, indeed, within the last few years; but, as is very well known, with the exception of some specially intended for preserving fruit and vegetables, there has hitherto been no really efficient and reliable process by which the decomposition or decay of food products in general could be prevented. It is true that, taking the subject as a whole, numerous and important improvements have been made; in the manufacture of ice and refrigerating machines; in the modes of pickling or salting meat; in the compressing and sealing in tins of various preparations, &c., &c.; but all these contrivances, even when most successfully carried out, present some objections which are fatal to their general use; they are either injurious to the flavour or destructive to the nutritive value of the substances intended to be preserved; the processes themselves are too complicated in their action or too uncertain in the results obtained; or, lastly, the cost of the preserved substance is such that it is useful only in an auxiliary sense, and is utterly inapplicable to the every-day requirements of the people at large.

* * * * * * *

"By a few minutes' labour, and at a trifling outlay, anything of animal origin—from a beefsteak to a bullock; from a whitebait to a whale—can now be preserved sweet, wholesome, and uncontaminated, for days, weeks, or months, if necessary, wholly irrespective of country, climate, or time of year.

* * * * * * *

"In the first place, it will be as well to consider for a moment the chief causes of failure hitherto in the preservation of meat, fish, poultry, &c., speaking, of course, in a practical and commercial—not a scientific point of view—as it is well known that many operations can be successfully performed in the chemist's laboratory which are far too difficult and expensive to be carried out upon a large scale. We may dismiss the preservation of food products by means of ice or freezing mixtures in a word, as they are evidently capable of very limited application. Some of our large butchers, fishmongers, &c., keep their goods in ice cellars during the hottest seasons; but this practice is quite exceptional, and probably not one per cent. of the dealers in such perishable articles have the means of keeping them moderately cool in summer. Even in these instances the advantages to the public are considerably modified by the fact that frozen animal food, when exposed to a warm temperature, will putrify with very great rapidity. According to Dr. Cattell, animal food, and more especially fish, is always rendered less nutritious by the freezing process, and is the cause of much ill-health.

"Of the other methods of preserving animal food that call for a passing notice, the salting or curing plan must of necessity rank foremost, as it has been in use for centuries, and, to a moderate extent, is convenient,

popular, and beneficial. Salt, however, is powerless to preserve meat effectually in any but the coldest weather, unless so large a quantity is employed that substances thus treated are both unpleasant to the palate and dangerous to the health.

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"Suffice it that in excess salt is very injurious, and that, innocent as it is popularly believed to be, more than one case of 'poisoning' by its use has been recorded by Dr. Christison and others. Another and a grave disadvantage attending the use of salt is, that meat loses from one-quarter to nearly half of its nutritive value in the usual salting processes, and is almost entirely robbed of those mineral constitutents, more particularly potash, the want of which induces scurvy and other diseases.*

"Of the dried, powdered, compressed, or extracted meats we need say but little; their applications are so extremely limited that it is out of the question to consider them in relation to the broad subject of food for the people. For travellers, invalids, children, &c., they are frequently of service in the absence of more rational food, but their cost is always treble or quadruple that of the more common but practically wholesome beef and mutton.

"Lastly, we must notice the meats put up in hermetically-sealed tin canisters, either with or without the addition of salt, spices, or antiseptics. It cannot be denied that these preparations have proved of great utility to our soldiers, sailors, and explorers, as a change from the 'odious salt meats,' and that they have exercised a marked influence upon the health, comfort, and general physique of these classes of our countrymen during the last twenty years; but we have still to reiterate the same fatal drawbacks to their general use, namely, uncertainty,† want of flavour and nutrition, costliness, and, in many cases, a very unpleasant metallic taste derived from the containing vessel. Besides these special disadvantages, which vary with each particular process, there is another and a serious one, common to all the preserved meats of this class:—They are, without exception, prepared at a temperature considerably above the boiling point of water, and are, consequently, much over-cooked in the first instance.

"Similar objections, in a greater or less degree, apply also to those preparations which are merely *coated* with a thin film of some substance, which is air and water proof, such as wax, paraffin, collodion, gutta-percha, &c.; while, if the protecting envelope of these last is broken or punctured at any one point, however small, decomposition sets in immediately."

* * * * * * *

Messrs. Medlock and Bailey go on to say their "process for the preservation of animal substances possesses manifold advantages over all others hitherto proposed, but more especially those of economy and simplicity of application. By its means the meat, poultry, game, fish, &c., of a large household, or wholesale establishment, can be effectively preserved for months in any weather, at a nominal expenditure of time and money; no soldered tin cases are required; no complex apparatus is necessary; no want of flavour or nutritive power is the result; and, finally, whether the edibles thus treated are eaten in two days' or two months' time, nobody, save the actual manipulator, need know anything about it.

* * * * * * *

"In the case, say of a small family who wish to keep a leg of mutton, or a sirloin of beef, for a week in sultry thundery weather, with the thermometer at 90 deg., take a teacupful of 'Medlock and Bailey's Patent Bisulphite of Lime Solution,' a dessert spoonful of common salt, and about a quart of cold water, mixing the same in an earthen pan, basin, or other suitable vessel. Dip the meat in this mixture for a few minutes, taking care with the end of a cloth to wet it all over, then hang the joint up as usual. A dip, night and morning, will ensure its keeping sweet and fresh for any length of time. If the weather is unusually hot, a cloth soaked in the same solution may be wrapped round it with advantage.

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"Game or poultry may be treated in precisely the same manner, having been first plucked and drawn. Fish, too, should be previously gutted. Eggs may be retained in the fresh or 'new laid' condition, simply by being completely covered over with bran soaked with the same liquid mixture; while bacon can be prevented from getting 'rusty' by this simple plan. If the joints are large and numerous the proportions should be thus:—

Bisulphite of lime	2 quarts.
Common salt	1 pint.
Water	4 gallons.

"When the meat, &c., is required for cooking, all that is necessary is to lay it in cold water for a few minutes, and afterwards to dry it thoroughly in a cloth; on a close inspection no odour or other alteration whatever will be apparent—the lean will not be reddened, nor the fat changed to the deep yellow tint so often apparent with 'hung' meat, and the texture will be, as at first, firm and consistent. Nay, more, if, not content with the evidence of our ordinary senses, we place a portion under the microscope, we shall observe that the general structure of the tissues has not suffered in the slightest degree; and if we went further, and delivered the whole to an analyst, his report would be that the various nutritious principles were present as usual, and had not sustained the slightest injury.

"With the view of testing the effects of this new preservative in tropical climates, some beef, mutton, fowl, salmon, lobsters, &c. were treated by Medlock and Bailey's patent process, and exposed in a chamber, specially arranged for the purpose, to a temperature varing from 80 deg. to 110 deg. Fahr. Portions of the same joints, fowls, &c., not prepared in any way, began to emit an unpleasant odour in about 16 hours, and were absolutely putrid in 12 more, while those treated with the preservative mixture showed no sign of decay whatever during the whole period of twelve days; from the very high temperature to which they were subjected, a little oily matter separated from the fish, but the original odour and flavour remained unimpaired to the end of the time, even the lobsters being pronounced 'delicious, evidently just boiled,' by those who partook of the same. The eggs which had not been treated with the bisulphite, &c., all, more or less, decomposed under the influence of the heat, while the others remained 'new-laid' throughout. In a word, these experiments, intended to test, in the most severe manner, animal food treated with bisulphite of lime, at a tropical temperature, simply afforded still further evidence of its practical use.

"At the time at which we write, some three months since the trials we have just recorded, all the meats, fowls, &c., remaining uneaten are perfectly good and sweet, although exposed to the ordinary changes of temperature, &c., in a rather warm room."

* Dr. Marcet's plan of enclosing the meat in bladder, or some similar material, before immersing it in the brine, by no means obviates these objections, although, to a certain extent, an improvement upon the old method.

† By "uncertainty" we mean that when once a tin of "preserved meat" is soldered down, no person can tell what it is, or in what condition it may be. Many of these tins are wrongly labelled, and our readers will remember that in 1851 (out of one particular batch only), of 6,000 tins of preserved meat supplied under contract to Government, and opened, more than 5,000 contained putrid meat and offal!

Proceedings of Institutions.

EXAMINATION PAPERS, 1867.

The following are the Examination papers set in the various subjects at the Final Examination held in April last:—

(*Continued from page* 549.)

GEOMETRY.

THREE HOURS ALLOWED.

1. If one side of a triangle be produced, the exterior angle is greater than either of the interior opposite angles.

2. The three interior angles of any triangle are together equal to two right angles. Show how this may be proved experimentally as well as by reasoning.

3. In any right-angled triangle the square described upon the side subtending the right-angle is equal to the squares described upon the sides containing the right-angle.

4. Divide a given right line into two parts, so that the rectangle contained by the whole and one of the parts shall be equal to the square of the other part. What is the numerical ratio of the part so found to the whole line?

5. Equal straight lines in a circle are equally distant from the centre.

6. The opposite angles of any quadrilateral figure inscribed in a circle are together equal to two right-angles.

7. Upon a given straight line describe a segment of a circle which shall contain an angle equal to a given rectilineal angle.

8. Inscribe a regular hexagon in a given circle.

9. In a right-angled triangle, if a perpendicular be drawn from the right-angle to the base, the triangles on each side of it are similar to the whole and to one another. Prove this. Hence show how to find a mean proportional between two lines.

10. In equal circles, angles at the centre have the same ratio to one another which the circumferences on which they stand have to one another.

11. If two straight lines are at right-angles to the same plane, they shall be parallel to one another.

12. If straight lines be cut by parallel planes, they shall be cut in the same ratio.

PROBLEMS.

1. If the sides of a quadrilateral be bisected, and the points of bisection be joined, the included figure is a parallelogram, and its area is half the area of the original figure.

2. Place a straight line in a circle which shall be commensurable with the diameter.

3. If two sides of a quadrilateral described about a circle be parallel, each of the other sides will subtend a right-angle at the centre of the circle.

4. If on the sides of a quadrant semi-circles be described, the part which is common to both semi-circles is equal to the part of the quadrant which is exterior to both.

5. If a straight line be drawn cutting any number of concentric circles, show that the segments it cuts off cannot be similar.

6. Through a given point draw a circle touching a given circle, and also another circle passing through the given point.

7. There cannot be more than two similar triangles inscribed in the same segment of a circle.

8. In an isosceles triangle inscribe three circles, each of which shall touch the other two and also two adjacent sides of the triangle.

9. How can a line be drawn perpendicular to two lines which are not in the same plane?

10. Two points are taken on two walls which meet at right-angles, or at any angle, what will determine the position of the shortest line from one point to the other?

MENSURATION.

THREE HOURS ALLOWED.

1. Find the area of the rectangle which is 14ft. 6½in. long and 4ft. 8in. broad; and the length of the rectangle which contains 172ft. 18in. and is 6ft. 9in. broad.

2. A wooden partition is 69ft. 11in. long and 42ft. 7in. high: what will it cost at £6 15s. per square?

3. Find the number of gallons contained in a cistern 6ft. 8in. long, 3ft. wide, and 2ft. 6in. deep. Find also the cost of lining it with sheet lead of 10lbs. to the foot at £2 2s. per cwt.

4. Find the area of a piece of land from the following notes:—

	186	
	130	64
56	72	32
	28	18
50	0	

5. The diagonals of a quadrilateral intersect one another at an angle of 30°, the perpendiculars upon them from the four angles are 1, 2, 3, 4: show that the area of the quadrilateral will be either 21 or 24 or 25.

6. Two rectangles each six inches long and an inch broad are laid across one another so that the part in contact is half the area of one of the rectangles: show how this may be done.

7. A regular triangle, square and hexagon, have their perimeters of the same length, compare their areas; and, if their areas be equal, compare their perimeters.

8. A number of concentric circles are described with radii of 1, 2, 3, &c., inches forming circular rings: find which of two consecutive rings are to one another as 15 to 17. Also find two rings which are to one another as 1 to 3.

9. Find the radius of a sedgment-arch, having given the span and the rise.

10. A right-angled triangle, whose sides are 6, 8, and 10 inches, is made to turn round its greatest side, thus describing two right cones: find the volume contained within them.

11. A right pyramid has for its base an equilateral triangle whose sides are 10 inches long, and the area of its three sides is twice that of the base: find the height the pyramid, and the length of one of its edges.

12. A conical vessel is half filled with fluid, and when half as much more is poured in the surface rises an inch find how far the surface is then below the top of the vessel.

13. A sphere of silver (specific gravity 10·5) of 10in. in diameter is covered with a coating of gold (specific gravity 19·25) $\frac{1}{100}$th of an inch thick: compare the volumes and weights of the two metals, and find the weight of the silver.

TRIGONOMETRY.

THREE HOURS ALLOWED.

1. Find the number of grades in the angle of a regular octagon.

2. Find the sine and cosine of 15° and 18°.

If $\tan.(9a + 3b) = 2 + \sqrt{3}$

and $\tan.(7a - 2b) = 2 - \sqrt{3}$ find a and b.

3. Express $\sin.(A + B)$ in terms of the sines and cosines of A and B, where A and B are each less than 90°; first, when $A + B$ is $< 90°$, and secondly, when $A + B$ is $> 90°$.

4. What is the logarithm of ·0625 to a base 8?

5. In a triangle, $a = 133$; $b = 7$; $A - B = 90°$, find C; when log. 3 = ·4771213;
L. tan. 41° 59′ = 9·9541834; L. tan. 42° = 9·9544374.

6. If $\pi = 17a$, find the value of $\frac{\cos. a \quad \cos. 3a}{\cos. 3a + \cos. 5a}$
and show that
$\sin.^2(a+b) = \sin.^2 a + \sin.^2 b + 2 \sin. a, \sin. b, \cos.(a+b)$.

7. A B C D is a square, and O a point within it; having given the distances of O from A, B, and C, find the length of the side of the square.

8. Find the radius of the circle which touches one side of a triangle and the other two sides produced. If the centres of the three circles so described be joined, prove that the area of the triangle thus formed $= \frac{abc}{2r}$

a, b, c, being the sides of the Δ and r the radius of the inscribed circle.

9 Prove in a triangle A B C, that

$$c = a \cos. B + b \cos. A.$$

and thence obtain the cos. C in terms of the sides.

10. Show that

(1.) $4 \cos.^3 a \sin. 3a + 4 \sin.^3 a \cos. 3a = 3 \sin. 4a.$

(2.) If $\cos. \theta = \frac{\cos. \rho - c}{1 - c. \cos. \rho}$ then $\tan. \frac{\theta}{2} = \sqrt{\frac{1+c}{1-c}} \tan. \frac{\rho}{2}$

11. The upper half of a column of given height, seen from a point on a level with the base of the column, subtends an $\angle = \tan.^{-1} \frac{1}{3}$, find the distance of the point of observation, and the elevation of the column.

12. A B C D is a parallelogram, A C and B D the diagonals, given A B, $\angle$ C A D and $\angle$ D B C, find the area of the parallelogram.

13. Show that,

$$\text{Tan. } n\theta = \frac{\text{sine. } \theta + \text{sin. } 3\theta + \text{sin. } 5\theta + \ldots \text{ to } n \text{ terms.}}{\cos. \theta + \cos. 3\theta + \cos 5\theta + \ldots \text{ to } n \text{ terms.}}$$

14. Find the cosine of the angle of a spherical triangle in the terms of the cosines and sines of the sides.

15. Deduce from the above result the values of sin. $\frac{A}{2}$ and tan. $\frac{a}{2}$

16. State Napier's rules, and if c be the middle part and C the right angle, prove that case of the rules.

17. Solve the oblique-angled triangle C, a b being given.

CONIC SECTIONS.

THREE HOURS ALLOWED.

Section I.—Geometrical Conics.

1. Define a cone, and show that, if it is cut by a plane parallel to one of its slant sides, the ordinate of the curve formed by the section varies as the square root of the abscissa. What is the co-efficient of variation?

2. In the parabola prove that (1) the tangent bisects the angle between the focal distance and a line parallel to the principal axis, (2) the sub-tangent is equal to twice the abscissa.

3. Prove that tangents drawn at the extremities of a focal chord of a conic intersect in the directrix, and show that in a parabola they intersect at right angles.

4. Define an ellipse in reference to a focus and a directrix, and prove that the sum of the focal distances of any point in the curve is equal to the major axis.

5. What is the auxiliary circle? Prove that perpendiculars drawn from the foci on a tangent intersect the tangent in the auxiliary circle.

6. Prove that the area of a parallelogram circumscribed about an ellipse and having its sides parallel to conjugate axes is constant.

7. Deduce the preceding proposition from a property of the circle by projection.

8. Draw tangents to a hyperbola from a given point without it.

9. If the normal at any point P of a hyperbola meets the transverse axis in G, then SG : SP : : CS : CA.

10. Define an asymptote to a hyperbola, and, given the centre and length of the axes, construct the asymptotes.

Section II.—Analytical Conics.

11. Investigate the equation to a straight line, and find the co-ordinates of the point of intersection of two given straight lines.

12. Find the length of the perpendicular from the origin on the line passing through the two points (x', y') and (x'', y'').

13. What is the equation to the circle, radius $= c$, referred to two tangents perpendicular to each other as co-ordinate axes? Also what is the equation to the normal which passes through the origin?

14. Find the equation to the normal of a parabola, and determine the point at which the normal at the extremity of the latus rectum again meets the curve.

15. Prove analytically the theorems contained in 2, 3, 5, 6, 9 of the preceding section.

16. If the base and ratio of the sides of a triangle are given, prove that the locus of the vertex is a circle. What are harmonic conjugates?

17. Show that the equation to a hyperbola may be put into the form $xy = k^2$; give a geometrical interpretation of the equation.

(To be continued.)

PARIS EXHIBITION.

The hall of conference, or lecture-room, in the park of the Exhibition, has not had the success expected by its promoters, and the Imperial Commission has decided that gratuitous lectures or conferences shall in future be given either in the galleries of the Exhibition itself, or in the buildings without, in the locality of the objects to which they refer. The new series has just commenced, and the following is a portion of the programme:—

Tuesdays, from 10 to 11 o'clock, in the French machine gallery, M. Thomas, engineer:—1. On the manufacture of caoutchouc, illustrated by apparatus exhibited by MM. Guibal, Aubert, Gérard and Co. 2. On apparatus for washing in vacuo, exhibited by M. Berjot.

Thursdays, 8 to 10 a.m., in the park, Allée du Forez, M. Rouart, civil engineer, on the manufacture of ice, and the square machine exhibited by Messrs. Mignon and Bouart.

Fridays, 1 to 3 p.m., park, Allée de Bretagne, M. Thomas, on candle making.

Tuesdays and Fridays, 8 to 11 a.m., in the chemical laboratory established by the side of the river, near the Pont de Jena, M. Wiesnegg, exhibitor, on heating apparatus for laboratories. Experiments in the fusion of iron by Schlæsing's process; experiments in the fusion of copper by Perrot's process.

Thursday and Saturday, 8 to 11 a.m., same locality, M. Giroux, on the regulation of gas, and experiments on the regulation and illuminating power.

Tuesday and Friday, 2 to 5 p.m., same place, M. Swarzweber, conferences and experiments on the industrial production of oxygen, Tessié du Motay and Maréchal's process.

Wednesday, 2 to 4 p.m., same place, Baron de Plazanet, experiments in galvano-plastics.

Tuesdays, from 2 to 5 p.m., and Fridays, from 9 to 11 a.m., same place, M. Pontier, exhibitor, on distilling apparatus for laboratories and private houses.

M. Ferdinand de Lesseps will also explain the works of the canal of the Isthmus of Suez, the various difficulties that have been surmounted, and the actual state of the works, on Tuesdays, the 23rd and 30th of July, and 6th August, at 10 a.m. These conferences will be held in the circular building in the park, before the panorama of the Isthmus.

MAURITIUS AND NATAL, AS SUGAR PRODUCING COUNTRIES, COMPARED.

The *Natal Mercury*, of a recent date, makes the following remarks on the above subject:—"At a time when we are anxiously looking out for any stray gleams of hopefulness that may shoot athwart the gloom of commercial depression, the interest which Mauritians are at last beginning to take in our colony is exceedingly cheering. Until now our neighbours in the Isle of France have rather despised and pooh-poohed us. They have ignored our sugar producing capabilities; affected disbelief in the success of sugar manufacture here; and regarded us as an obscure, insignificant little colony, which was attempting work far beyond its capacities. Not that

there has been rudeness in the way we have been treated by the Mauritians. They have always heard what we had to say, and whenever Natalians have visited them there has been no backwardness in giving information, in offering advice, and in dispensing unbounded hospitality. But they have fondly clung to the conviction that a country subject to visitations of frost, and so far removed from the tropics, could not grow sugar cane profitably during successive years. Latterly this delusion has been wearing off. Year after year sugar cane has been grown, and sugar made in an increasing ratio. A considerable export has been made. Mauritius brokers have read "Natal" quoted at fair rates alongside their own. Visitors from the island have personally inspected the colony, and returned with favourable reports of its natural features and capabilities. And now that misfortunes have befallen them, and the prospects of enterprise in their own sphere are clouded and contracted, the good people of Mauritius incline to look more curiously upon a colony where congenial pursuits are followed, where there is boundless scope for expansion, and which is more accessible to them than any other.

"It is clear that many years' experience of various drawbacks have made the Mauritians anxious about their future. The borer, disease, drought, and hurricanes, have at last reduced their cup to half what it once was. Labour is costly there; food is dear; the climate is precarious; above all, the area of available land is limited—is, in fact, pre-occupied. We by no means think that Mauritius is in such a bad case that recovery is hopeless. A few years may find her more prosperous than ever. But meanwhile, the circumstances of the colony are such, that we don't wonder its residents are casting their eyes abroad in search of "fresh fields and pastures new," where their sons may plant themselves and their fortunes afresh.

"The advent of a number of young Mauritius planters, armed with means enough—in the shape of credit or capital—to buy up old estates, or start new ones, would, we believe, be an undoubted boon. They would afford a market for the sale of embarrassed estates, where want of capital has made it impossible for the proprietors to carry on. They would transplant here the systems and the experience of the most successful sugar producing field in the world. They would place sugar planting on a new basis, and identify with our interests the large monetary and other institutions which offer to planters in Mauritius facilities little known here. If we wish to introduce sugar planters, then, a better class of men cannot be desired than these would be.

"Nor do we think that Mauritians will be disappointed in their experience here. They will find land and labour both plentiful and cheap; a climate far healthier, less oppressive, and more equable than their own; a virgin soil, which, even on the oldest plantations, has not yet been enriched by manure, except on a partial scale; and provisions moderately cheap. That they will also find much, in connexion with sugar planting, that they dissent from and disapprove of, is highly probable. Every Mauritian who has come here has said that radical improvements were necessary. It will be for them to give force and value to their objections, by showing that they can do better. When they do that, we have no doubt that Natal planters will but too gladly follow in their wake, and profit by their examples.

"Had we here such a government as one finds in some other places, and a local immigration department established, able to cope with any emergency that may arise, this important tendency on the part of Mauritius planters would be fostered and guided by the powers that be. The Mauritians seem to us to desire authoritative information, and they would attach more weight to representations proceeding from Government than from any other quarter. There would be no impropriety in governmental action on such a subject. The matter is one of vital consequence, and might affect most materially the welfare of the country. Had we such a department as the Legislative Council has often proposed should be established, instead of a feeble Board, which can show no practical results of its long but weakly existence, it would naturally and properly fall within its province to communicate to the Government of Mauritius such data as might be required by persons there, in coming to a decision upon the expediency of migration. There would be no impropriety in such a course of action—nothing that would be foreign to the functions of an enlightened Government. But our executive seems in dire want of some powerful stimulant to effort. It has done nought so far to restore us. Its intentions, we believe, are good, but its works are inappreciable, while its action has been partially paralysed by the inconclusive policy of the legislature. When the colony needs more than ever strong guidance and help, it is most helpless. But Heaven helps those that help themselves; and despite the shortcomings of its rulers, we trust that the self-reliant energies of the colonists, individually, will enable them, unaided, to retrieve their misfortunes, and to gain their ends. In any case, should any Mauritians come here on a 'prospecting' mission, or with actual views of settlement, we can promise them, on the part of the colonists, a cordial welcome, and all the facilities that we have it in our power to offer."

Fine Arts.

English Amateurs of Art in France.—Only a short time since, Bordeaux lost the best friend of artists, and one of the most enlightened connoisseurs and friends of art, in Mr. Scott, late British consul at Bordeaux. Marseilles has just suffered a similar loss by the death of Mr. Robert Gower, of that city. Mr. Gower had one of the finest collections of works of art in the south of France; his private residence, called the Château de Repentance, at Aix, was a perfect museum of paintings, sculpture, antiquities, porcelain, and faïences of a very high class.

The British Institution.—A correspondent of the *Standard*, after expressing his great regret at the contemplated dissolution of this establishment, which for "more than half a century has been of the greatest service to art and its highest development in the sister studies of painting and sculpture," gives the following particulars:—"On referring to a carefully-compiled hand-book, entitled 'Recollections of the British Institution,' by Thomas Smith, published in 1860, we find that, since the foundation of the institution to the year 1859, no less a number of original paintings by British artists than 23,150 have been exhibited in the gallery, and that the sales arising from such exhibitions, without any expense to the artists, have amounted to more than £150,000; and, on looking through the catalogues of these various exhibitions, many then comparatively unknown names occur in the early ones which in later days became famous aud celebrated all over the world. Amongst them may be mentioned Beechey, Bourgeois, Callcott, Copley (father of Lord Lyndhurst), Daniel, Fuseli, Howard, Lawrence (a future president of the Royal Academy), Northcote, Opie, Reinagle, Smirke, Stothard, Bird, Turner, Ward, Benjamin West (another president of the Royal Academy), Westall, Shee and Eastlake (two other future presidents of the Royal Academy), Linnell, Haydon, Wilkie, Collins, Etty, Constable, Hilton, Martin, Jones, Hayter, Landseer, Briggs, Mulready, Ross, Stark, Jackson, Stanfield, Danby, Leslie, Uwins, Roberts, Herbert, Pickersgill, &c. In donations to artists and complimentary premiums, by way of encouragement to the young and meritorious, the institution has given some £15,000; and in the purchase of pictures and sculpture, which in most instances have been given to the nation—as may be seen by a visit to

Greenwich and Chelsea Hospitals, the National Gallery, and many of the metropolitan churches—some £13,000 in addition."

Ceramic Museum, Limoges.—A large number of specimens of modern china and earthenware in the Paris Exhibition have been purchased for or presented to the Museum of Limoges. This establishment was heretofore scarcely known in Paris, and it is now brought prominently before the world by the perseverance of the director of the museum, M. Adrien Dubouché, who made an appeal for subscriptions in the Limoges journals, and in a few weeks obtained 9,000 francs; he then visited the Exhibition, made some purchases, and the potters were so well pleased with the idea of seeing specimens of their productions placed in a museum, that they presented more than 20,000 francs' worth for that purpose to M. Dubouché, who is collecting more subscriptions to purchase specimens of the pottery of foreign countries. Messrs. Minton, Copeland, Wedgwood and other English firms, whose table services, enamelled and brown stoneware are in great request here, have all contributed towards the collection of the museum. M. Dubouché's next object is to obtain specimens of Spanish pottery, of the curious red and blue ware of Morocco and Algeria, of the Japanese porcelain, and the decorative tiles of Egypt and Persia. The idea of a museum of modern ceramic is a good one, and it is very appropriately situated in a town whose productions of a kindred kind are held in such high esteem. The Berlin Museum is also purchasing and collecting largely in the same field.

Manufactures.

London Gas.—The course of six lectures on coal gas, recently delivered by Professor Frankland at the Royal Institution, concludes with the following protest against the bad quality of London gas:—"What, then, is our position in this great and wealthy city with regard to the supply of gas—in this the metropolis of the country, which annually yields such vast quantities of the finest gas-coals in the world, and sends these coals half round the earth to illuminate the cities of other nations? An inspection of the table I have just referred to fails to convince me that we are fairly and considerately treated in this respect. Perhaps as consumers we are rather partial in the matter; but still we are entitled to be heard from our point of view. To obtain the light with which the inhabitant of Edinburgh or Glasgow illuminates his drawing-room, we have to burn double the amount of gas, and to have the atmosphere of our drawing-room contaminated with double the heat and moisture, and many times the amount of sulphurous acid. Some sixteen years ago I examined analytically and photometrically the gas supply of the metropolis, and I have no hesitation in saying that it was better then than now. How is this to be accounted for? Has invention, which has been so busy in improving other manufactures, left that of gas untouched? By no means. Improved retorts, exhausters, and purifying processes have been brought forward in abundance. Have, then, the gas companies disregarded these improvements? By no means. Whenever the improvement promised to reduce the cost of the manufacture of gas, they have eagerly adopted it. Thus, within the time I have just mentioned, they have revolutionized their process of purification, having adopted a method which greatly decreases the cost of that purification, and increases the volume of the gas, but which reduces its illuminating power by 11 per cent., and makes it utterly unfit for use in dwelling-houses, by leaving it contaminated with those sulphur compounds which, on combustion, impregnate the surrounding air with stifling fumes of sulphurous acid. Thus an improvement which reduces the cost of production, but seriously deteriorates the quality of the gas, has been universally adopted, whilst inventions which have had for their object the improvement of the quality of the gas as delivered to consumers, but which have offered no advantage to the producer, have been, without exception, utterly ignored. I do not enter into the subject of price, though something might be said on this head, because, in a wealthy city like this, cost is, with most consumers, a secondary consideration. The man who spends thousands in furnishing his mansion has a right to expect, in the present state of science and manufactures, that his house shall be lighted with a material that shall not damage and destroy the works of art and the things of beauty with which he surrounds himself. He has, I conceive, a right to demand that, in this respect, he shall not be treated worse than the inhabitants of second or third rate towns. He is willing to pay any fair price for such an article, since, if the present price were doubled, it would still be far cheaper than that of any other illuminating agent; but he must have good quality, for without it this grand invention of the century is lost to him. Let the metropolitan companies see to this in a liberal spirit, and let the consumers understand that low-priced gas is not necessarily cheap gas, and then we shall soon, I hope, have a gas of not less illuminating power than twenty candles per five cubic feet per hour, below which quality no gas is fit for domestic use."

Ice-making Machine.—Messrs. Flower and Sons, brewers, Stratford-on-Avon, have for several years used ice for preserving yeast and for other brewing purposes. They have now, after a long series of trials, succeeded in applying Kirk's patent ice-making machine (described in this *Journal*, October 7, 1864). The machine they have in use is capable of producing three tons of ice in twenty-four hours; and it can also be employed in cooling beer direct, by passing cold brine instead of spring water through the refrigerators.

Commerce.

Imports and Exports of France.—The Customs returns for the first five months of the present year exhibit extraordinary changes in the commerce of the country. The imports of cereals and other alimentary matters caused by the badness of crops amount to 93,000,000 of francs more than in the same months of last year, while the exports show a diminution of 198,000,000 of francs (£7,920,000). This great deficit is made up of the following items:—Diminution of 116,000,000 on agricultural produce; of nearly 72,000,000 on miscellaneous matters; of 40,000,000 on silks; of 11,000,000 on woollens; 6,000,000 on made-up clothing; between 3 to 4,000,000 on articles of fashion; 4,000,000 on cotton goods; and 3,000,000 on metal work. The totals for the five months are given as follows:—

	Francs.
Importation	1,303,000,000
Exportation	1,293,000,000
Difference	10,000,000

During the same five months last year the exports exceeded the imports by the sum of 322,000,000 francs.

Colonies.

Queensland Cotton.—A Brisbane paper says that it is expected that this year cotton will prove a large feature in the exports of this colony. Last year the exports were 196,698 lbs. clean, and 10,568 lbs. unginned cotton, and this year the crop promises to reach up to 3,000 bales, or about three times that of last year. The crop generally is heavy and of good quality. The average of green seed sowing promises about 300 lbs. of clean cotton to the acre.

Iron Manufacture in Australia.—The question of the manufacture of iron is now occupying considerable attention in South Australia, the iron ores of this colony being unbounded in quantity, lying close to the surface of the ground, and of extraordinary richness, some of them 90 per cent. The difficulty is want of coal, but there are inexhaustible forests of wood for smelting, and even if coal had to be imported from New South Wales the extreme richness of the ores would doubtless more than make amends for the extra cost of fuel.

Notes.

Aeronautical Society of Great Britain.—On Monday, the 15th inst., a meeting of the members of the Aeronautical Society was held in the great room of the Society of Arts; his Grace the Duke of Argyll in the chair. Dr. Wm. Smyth, L.R.C.P., read a paper upon some experiments he had made upon the powers of flight of birds. He found that the wing of a strong pigeon strikes the air with a force which will raise a pound weight one foot high in a minute. But directly the stroke has produced its greatest mechanical effect, it is suddenly cut short, nerves in the wing of the bird letting it know when the maximum effect is attained. He succeeded in cutting some of the nerves of the bird from the organs of motion, the result being that, although the bird flapped the air harder than before, it could not fly. He thought, therefore, that in attempting flight by means of artificial wings, the stroke must be cut short when it has attained its maximum. On these principles he proposed a machine with artificial wings, propelled by motive power obtained from the explosion of mixed oxygen and hydrogen gases. The heat thus produced is not great, and the gases would be exploded in indiarubber accordion-shaped vessels, and these by their expansion would give the stroke. Major J. Scott Phillips proposed a machine with large flat planes before and behind, which would lie in an inclined plane when flying, so as to heap up before and beneath the machine a pressure of air equal to its own weight. It had hoof-shaped wings, propelled by a steam-engine. A paper by Mr. F. Bourne described a little model which raised itself in the air by screws. Mr. Henri Reda St. Martin, a Corsican, exhibited a model machine, made on the principle of a kite, the pull of the string being supplanted by the hold on the air obtained by means of screws. Mr. W. Sadd exhibited a model raised by horizontal cylindrical balloons, and propelled by a screw. Mr. F. W. Breary read a paper by Mr. Artingstall. A few remarks were made by Messrs. F. H. Wenham, C.E., Mackie, Young, H. Bright, and others, and the meeting closed.

Change in the Cab System of Paris.—The Municipal Council of Paris has, it is said, come to the determination to adopt mileage rates in place of the present course system. The new tariff announced is as follows: For a vehicle carrying two persons—85 centimes for the first kilomètre; 25 centimes for each kilomètre after. For one carrying four persons—90 centimes the first kilomètre; 30 centimes each kilomètre beyond. A kilomètre being roughly five-eighths of a mile, and 90 centimes rather less than nine pence, the latter rate will be equivalent to about seven pence for the first half mile, and less than three pence for each succeeding half mile. The difference between the price of the two and four horse vehicle is so trifling as to be almost nominal. The present system is certainly unjust to all parties. To pay for a very short course fifteen or eighteen pence, according as the cab has seats for two or three, with a gratuity to the driver, is certainly too high, while a course from one extremity of Paris to the other is certainly too long for the same money; but to carry the new plan into successful operation it is held here that a meter is absolutely necessary to settle the question of distance, and although an immense number of instruments have been produced for the purpose in Paris, it was the opinion of the municipal authorities a very short time ago that none of the meters submitted for trial were entirely satisfactory. It is to be hoped that the resolution of the Council alluded to indicates the production of a suitable instrument.

Correspondence.

Industrial Education and the Paris Exhibition.—Sir,—I have just read in the *Engineer* of 12th July a paper written by Mr. James Kitson, junior, and produced at the annual meeting of the Yorkshire Union of Mechanics' Institutes, which I recommend you to re-print, as being a fair and suggestive comparison between the relative positions of the United Kingdom and foreign countries in the competition for industrial supremacy. It is as follows:—

"The question of industrial education has been raised in a letter recently published in the *Times* by Dr. Lyon Playfair, and our president has directed the attention of several of our friends to it, who will probably shortly address you; to confine the discussion I will, therefore, content myself at the present moment by considering the remarks and proposals of Dr. Playfair, though it is a topic which might be advantageously examined in a more extended manner. I will first reply to the statement made by Dr. Lyon Playfair, that a singular accordance of opinion prevailed, that our country (England) had shown little inventiveness, and had made but little progress in the peaceful arts of industry since 1862. This is a very bold and a very disparaging statement, and is so derogatory to our country that it is desirable to examine into the grounds on which it is based, and to see whether it is not rather an opinion founded on limited or deficient information, than one which is a true representation of the progress of arts and manufactures in our country. In the first place, it is incorrect to judge of the manufacturing excellences and the power of production of England from the objects and collections at the Exhibition. France has exposed the products of her manufactures at her own doors, and, what is of more importance to her, in her own market. England has had to transport her articles across the sea, at a much greater cost, and to a market which is to a great extent closed to her. France has in manufactures as well as in war a great idea of glory; England has in trade little idea of glory, but a great idea of doing what will pay. The French have an opportunity of gaining both glory and profit, and hence have been induced to make great efforts to appear well at their universal Exhibition. It is important to bear this in mind, and if we attempt to compare the industrial progress of France with that of England, we must remember that France has shown the choicest products of her manufactures, while we have much at home superior which it has not been thought advantageous to represent at Paris. The great houses of France have spent enormous sums of money on their displays, which no English firm would have been justified in spending. Indeed, it is said that some of the foreign exhibitors have received subventions from their States, while English exhibitors have had to defray the whole of their own expenses. It is true our Government has voted some £200,000 towards the English sectional expenses, but I fear that this sum will not fertilise the pockets of the English exhibitors, as it appears already to have been absorbed by the commission appointed by the mysterious and despotic powers at South Kensington. I would instance, as exhibitions which have produced the feeling of depression on the minds of many of our jurors and writers, the pavilion of Le Creusot. It is a remarkable and a beautiful exhibition, and most beautiful as showing the power and immense capacity of a single establishment, but there is nothing in it which we do not produce in England of in

most points superior quality, and certainly of superior design. The locomotive engines made for an English railway, for which Mr. Schneider obtains great praise, are from English designs, and their construction has been controlled by an English inspector, who has gone direct there immediately after controlling similar works in the best English workshops. Mr. Schneider exhibits three locomotive engines in his own pavilion—the whole of England sends but five; but it would be very erroneous to judge from this the comparative powers of the two countries. I think I have said sufficient to warrant me in asserting that there is a very deficient representation of English manufactures, and, therefore, those who would compare the industry of this country with that of foreign nations must carry their inquiries very much beyond the boundaries of the Paris Exhibition. In my observations as to the position of England in the Exhibition, I naturally prefer to confine myself to those departments with the products of which I have a practical acquaintance; in these I am fortified by having similar opinions expressed to me by men of greater experience, but I have no hesitation in affirming in all the different branches of trade connected with mechanical science we still stand without superiors. I will mention some of these in detail. In marine engines our makers are superior to any of the Continent, both in finish and design. The English marine engines are gems of mechanical finish. In locomotive engines we have the best specimens in the Exhibition; they are equalled in finish of work by one or two foreign engines, but are unequalled in beauty of form and simplicity, and appropriateness of construction. In machinery for working iron and other metals we have no equals. Our makers show the best quality of work, the most mechanical ingenuity and the greatest beauty of form and outline. The best foreign machine tools are copies of English designs, and the engines whose work nearest approaches the English excellence of finish have been made for the most part with tools constructed in the manufactories of Leeds and Manchester. In iron we exhibit in very small quantities samples of unequalled quality, but only the makers of iron of special quality are represented. The great houses who make iron most in demand for the general purposes of commerce are not represented, and for the simple reason that it would not pay them to exhibit. France has high duties on manufactured iron, which close her markets to English produce, and therefore there is no inducement to England to show samples of wares for which she has no market there. The *tours de force*, as samples of skill and power, exhibited by various Continental ironworks, are very remarkable, and exhibit an extraordinary advance in this branch of French industry. Enormous plates, bars of great length and large sectional area are to be seen in great abundance, but are only interesting as showing what can be done, and that any demands of the engineering profession can be satisfied. These heavy plates are not as large as are rolled in England, and all their bars can be as well obtained from English makers if such be required. The material shown by our War Department, by Sir Wm. Armstrong, by the Whitworth Company, is incontestibly superior in finish to any other exhibited; all the products of these manufactories are remarkably beautiful, and in advance of those of any nation. I have ventured to give you these specific references to sections of our manufactures, because it is more valuable to give a few positive examples of my view of our position than to make general statements, and also because I think they are sufficient to confute the assertion that we have been surpassed in mechanical science, and to show you that if pre-eminence has been denied us, it has been denied us by those who have not had sufficient information on which to ground their judgment. In the fine arts and in manufactures where the fine arts are most directly applied, I am rather diffident in expressing an opinion, but I have seen specimens of engraved glass, designed by Englishmen and executed by English workmen, which are unequalled by any country exhibiting. On this point it is interesting—indeed, almost amusing—to read an extract from the *Journal des Débats*, which, as you know, is one of the leading papers of France, in which the writer takes almost the same view of his own country that Dr. Lyon Playfair does of England, and endeavours to read to his country the same warning lesson that we have had from Dr. Playfair:—"A manufactory at Vienna sends some table services that are strikingly elegant in form, and though of crystal they are almost as light as Venetian glass. They are also comparatively cheap, which is an advantage that deserves to be noted. Cheapness is the principal merit of the crystal objects from Belgium that we have examined; but it is not so of those that come from England. The latter are perhaps less pure and less graceful in form than ours, but in the engraving they are admirable. Englishmen are rich and can afford to pay for fine things. They take away our most skilful workmen, and, in addition, are willing to make any sacrifice in order to extend instruction and education, and to improve the taste of their own operatives. During the last twelve years they have made enormous progress in every branch of industry to which art belongs. We Frenchmen must take care that one of these days we do not lose that artistic superiority in which our artizans have taken a lawful pride. Let us multiply our schools for adults; let us employ every effort to enable our workmen to have easy access to those admirable works in which engraving has produced the masterpieces of art in every epoch; if possible, let us open for them collections of objects of art, in every style, in the localities where they live. Let us be upon our guard. Our rivals have arrived very nearly equal to us, and we must take care not to have to say one day that they have surpassed us." Having said thus much in defence of my country, I am free to admit that continental nations have made giant strides in industry, and have relatively made greater progress in manufactures than we have. They had scarcely started a few years ago, while we had advanced to a very high position; and now they have attained to considerable excellence while we have contented ourselves in increasing the quantity of our manufactures, and in the profits of trade unparalleled in extent, and enlarging constantly in an increasing ratio. If continental nations have made these great advances which we admit in the space of a very few years, it is important for us to examine the causes which have favoured it, and to endeavour, if possible, to gather and use the experience of our neighbours. The nations which have made the most marked advances are France, Prussia, and Belgium, and as the same causes have been at work in all these countries, for the sake of brevity I will at the present time confine my remarks to the case of France. Seeing that the natural advantages of France as an iron producing country are inferior to ours, that it is deficient in mineral, which is consequently a drawback to all its manufactures, we can but come to the conclusion that the intelligence which has created and fostered the manufactures which have produced the brilliant displays set forth in the Exhibition, must be of a very high order. It has been my fortune during the past week to meet with several of the first engineers of France, and from them I learn the remarkable fact, that almost without exception, the chief engineers of the railways, of the Government department of the Ponts-et-Chaussées, and the heads of many of the large manufactories, had been pupils of the Central School of Arts and Manufactures, while most of the managers and foremen of works, engineering establishments, and factories have been pupils of the Ecole des Arts-et-Metiers. There are few exceptions to these; the rough and ready self-educated men rarely rise above those who have been educated at these schools, because they start the race of life under too serious a disadvantage. I cannot learn that their artizan population are better educated than ours; they are brought up under much the same conditions as ours, and

after attending their communal schools are set to work at an early age. In support of this view of the similarity of education in the two countries, I may mention that it was found that an average number of 300 conscripts in 1,000 in the year 1866 were unable to read; and in 1864 only 239 in 1,000 recruits in England were unable to read; the advantage is therefore on the side of England, more particularly when you bear in mind the class from which our recruits are taken, and that in France the conscripts are taken by lot from the whole population. If we find these pupils of particular schools monopolising the direction of the whole of the manufacturing industries of France, we cannot but acknowledge the merit the schools must possess; and also we could not bring forward a better example of the immense value of education, and can form from this fact some idea of what results we might be able to obtain if the moral and intellectual education of our whole people were as well cared for as the scientific education of a small portion of the French nation appears to be. The Central School of Arts and Manufactures is specially designed to form engineers for all branches of industry, and for public works. Diplomas of Engineer of Arts and Manufactures are given by the Minister of State to those who pass in the first class, and certificates of capacity to those who pass in the second class. Foreigners are admitted as well as natives, and the course is for a period of three years, commencing at seventeen years. The course costs £32 per year, but in certain cases the State will grant a subvention to needy scholars. The Ecole Centrale trains principally engineers who enter the higher grades of the profession, to which their diploma gives them an acknowledged certificate of competency. The Ecole des Arts-et-Metiers has three schools established at Aix, Angers, and Chalons-sur-Marne, which are designed to form chiefs of workshops and workmen instructed for industries where iron and wood are worked. Every pupil must pass an examination, and must be from fourteen to sixteen years old. Only resident scholars are received, who pay £20 a year. The course is for three years, and the instruction is practical as well as theoretic. The theoretic instruction comprises arithmetic, elementary algebra, trigonometry, geometry, mechanics, drawing, and grammar. The practical instruction is given in four workshops of models and carpentry, casting, smiths' works, and mechanical construction. Scholars arrived at the end of their studies receive a certificate, and a silver medal is granted to those who show an exceptional merit. The Conservatoire des Arts-et-Metiers, where public gratuitous lectures on scientific subjects are given, is also a valuable institution to which we have no parallel in England. Here are kept models of all inventions; in the museum are 7,000 models of mechanical appliances, and in the library are 18,000 volumes on scientific subjects, accessible without difficulty to any seeker of knowledge. By these institutions all the known information on scientific subjects is imparted to the students. Every new invention and new mechanical appliance is recorded and made known. The scholar is taught how to apply his classical and mathematical education to the calling which he is to follow, instead of being left, as in England, to gather his knowledge in the uncertain school of practical work. The student is thus started at a much more advanced point than he is in England, where we have no regular scientific schools, and is saved much weary plodding and stumbling through inquiries which have been worked out for him long ago. Our English school of practice has produced many glorious men, but how much weary work and wasteful toil might have been saved them if some such sources of information of the accomplished labours of the past had been opened to them. The work to be done in England in my opinion is, in the first instance, the education of the upper working and the middle class, a work which I think is above the power of Mechanics' Institutions and so-called departments of science and art. It is a question which is worthy of the earnest attention of Government, who are as much bound to interest themselves in the industrial education of the country as they are to regulate the education of the surgeon or physician for the prosperity of the country, and hence the material comfort and well-being of the population, without which you can have no true moral advancement, depends on the measure of success you obtain in your industrial pursuits. As far as the powers of Mechanics' Institutes can be developed, they should be exercised in the scientific education of the working classes of this country; and special attention should be given to the forming of some organisation by which this education can be made more efficient. Although I have stated that the working class of this country is as well educated as that of France, it is not so in Prussia, where, in some degree, education is universal. But in France they are fully alive to the advantage of educating the labouring population, and are making great efforts in this direction. At Creusot Mr. Schneider has established schools under most able management, where, out of a total population of 23,000, there are 4,065 children in regular attendance at school. If we do not bestir ourselves earnestly we shall soon see our working population surpassed in superior education, as at present we see we are surpassed in higher education by the engineers and managers of the great industries of France. There is little doubt that England can still hold the first place at the head of manufacturing industry if she will only make use of the advantages she possesses. Our engineers must have the facilities for acquiring special knowledge which are attainable in other countries, and our people must have the education which will enable them to turn to the best advantage the directions of those whose province it is to guide them. With mineral resources unequalled and unbounded, with a climate the most congenial in the world, and a freedom of government which allows to every man the reasonable hope of attaining any position to which his talents and industry may entitle him—the countrymen of Shakespeare and Watt and Stephenson, if afforded the same advantages of education as are given to those nations which compete with them, can never fail to lead in the industrial advancement of the world."

There is only one statement I wish to correct. The Government has not voted "some £200,000 towards the English sectional expenses," but Parliament has voted £67,000 as part of a total estimated expenditure of £116,600—which I believe will not be reached—and by far the greater part of this sum is to defray expenses which have hitherto been borne by English or French Commissions inviting foreign countries to compete.—I am, &c., Henry Cole.

Paris, 15th July, 1867.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 11th July, 1867.

234. Bill—Galashiels Jurisdiction.
236. ,, Factory Acts Extension (amended).
237. ,, Representation of the People (amended).
243. ,, Carriers Act Amendment.
329. Limited Liability Acts—Report and Evidence.
405. Mail Services (India and Australia)—Further Correspondence.
417. Vessels—Return.
Jews (Moldavia)—Further Correspondence.

Delivered on 12th July, 1867.

240. Bill—Master and Servant (amended).
241. ,, District Prothonotaries, Court of Common Pleas, County Palatine of Lancaster.
244. ,, Local Government Supplemental (No. 6).
245. ,, Justices of the Peace Disqualification Removal.
391. Army (Snider Rifle)—Reports.
422. Constabulary (Ireland)—Statement.
423. Quarantine—Return.
Revised Code (Scotland)—Minute.
Standard Weights and Measures Department—First Report.
Schools Inquiry Commission—Report.

Delivered on 13th July, 1867.

242. Bill—District Lunatic Asylums' Officers (Ireland).
247. ,, Parliamentary Elections (amended).
338. East India (The Deccan)—Treaties and Engagements.
421. Rangoon—Letter.
Gold Coast of Africa—Convention.
Education—Report and Appendix.
Public Petitions—Thirty-third Report.

SECOND DELIVERY.

250. Bill—Representation of the People (amended on consideration).

Delivered on 15th July, 1867.

248. Bill—Courts of Law Officers (Ireland) (amended on re-committment).
242. (R.) Merchant Shipping Tribunals (Supplementary Return)—Memorials, &c.
429. Factory Acts Extension and Hours of Labour Regulation Bills—Special Report.
432. Parliamentary Deposits—First Report.
435. Workhouse Dietaries—Papers.
Ship "Mermaid"—Correspondence.

Delivered on 16th July, 1867.

249. Bill—Metropolis Subways (amended).
362. Universal Art Catalogue—Correspondence.
Customs—Eleventh Report of the Commissioners.

Patents.

From Commissioners of Patents' Journal, July 19th.

GRANTS OF PROVISIONAL PROTECTION.

Bedsteads, couches, &c.—1884—W. Marshall.
Bench hooks—1918—F. T. Pollard,
Blankets used in machines for printing textile fabrics—1889—E. J. Hughes.
Boilers—2009—J. Credland.
Bottle holders—1985—C. Toft.
Bottle stoppers—869—A. S. Stocker.
Bottle stoppers—1921—W. Duce.
Bronzing machine—1783—L. Simon.
Brooch fastenings—685—J. J. Blackham.
Butter, preserving—1942—J. H. Johnson.
Buttons—1929—T. Young.
Carbon, apparatus for making sulphuret of—1886—C. O. Heyl.
Carriage bodies, pleasure boats, &c.—1903—H. J. Cox.
Casks, appliance for filling, &c.—1935—J. McKibbin.
Centrifugal governors—1936—H. and D. Davey.
Charcoal, &c., preparing—1983—W. Harris.
Chronographs—1957—A. A. Champion.
Cigars, &c., mouthpieces for—1945—W. Thompson.
Clocks—1915—J. G. N. Alleyne.
Coal, &c., machinery for getting—1927—J. Sturgeon.
Combs for warping, &c.—1909—J. Conlong.
Cotton waste, &c., extracting fatty matter from—1897—C. O. Heyl.
Croquet balls, &c., stands for—1960—J. Bolton.
Door handles—1902—A. Hodge.
Electric telegraphic machines—1917—F. T. Hubert and H. D. G. Truscott.
Engines and pumps, rotary—1984—W. Archer.
Engines, jacquard—1895—J. and T. Anderson.
Envelopes—1882—W. Davis.
Fabrics, fixing metals on—1913—C. E. Brooman.
Fabrics, ornamental textile—1807—W. Clarke.
Fabrics, textile—1906—A. Stewart.
Fabrics, &c., printing—1975—F. Andrew and L. Clarkson.
Fibrous materials, manufacturing cards for combing—2013—W. R. Lake.
Fibrous materials, opening and cleaning—1923—J. Greenhalgh.
Fire-arms, breech-loading—1904—S., R., and W. Trulock.
Fire-arms, breech-loading—1926—A. M. Clark.
Fire-arms, breech-loading—1932—W. E. Newton.
Fire-arms, breech-loading—1971—J. MacNaughton.
Fire-arms, &c.—1934—F. R. Aikman.
Furnaces—1955—T. and T. Vicars and J. Smith.
Furnaces—1980—T. Morgan.
Gas, manufacture and purification of—1931—J. Somerville and R. Elsdon.
Grain, cleaning—1997—A. Mather.
Grape vines, &c., training—1991—J. G. Tongue.
Hammers, steam—1944—D. Davy.
Hooks, spring—1746—T. Walker.
Hydrocarbon liquids, utilisation of waste material obtained in the manufacture of—1888—J. C. Sellars
Ice-making apparatus—1989—J. Whitford.
Iron and steel, manufacturing—1905—W. H. Richardson.
Jupons—1874—C. E. Brooman.
Jute, treating—1901—A. M. Fell.
Lamp and match box combined—1947—F. Leonardt.
Lamps for burning petroleum, &c.—1910—C. Petit.
Levels—2005—W. E. Gedge.
Looms—1870—J. Gabbott.
Looms—2017—H. English and J. Farndon.
Lubricating compound—1950—A. E. Herrmann.
Lubricators—1928—A. Schwartz.
Machinery, twisting or doubling—1896—J. Holroyd & W. Fieldhouse.
Metal sheathing for ships, &c.—1961—W. Day.
Motive-power engines—1892—C. Brown.
Motive-power engines—1941—R. Shaw.
Mowing machines—1995—J. Shanks.
Needle cases—2007—W. Avery.
Paper ruling machines—1946—J. Salmon and G. W. Hick.
Presses for cutting paper—1920—J. R. Burn.
Presses for stamping or endorsing—1890—A. M. Clark.
Pumps—1898—P. Zaroubine.
Railway switches and signals, apparatus for working—1959—F. Brady.
Railway trains, communicating intelligence between parts of—1878—C. J. Pownall.
Railways—1979—W. E. Newton.
Scarfs, &c.—1964—I. Pick.
Sheep, &c., purifying compounds for fleeces of—1900—A. M. Fell.
Ships' propeller and steerer—1963—A. V. Newton.
Ships, propelling—1958—H. Clarke.
Ships, &c., composition for preventing the fouling of the bottoms of—1924—G. A. F. Fowke.
Shutters, revolving—1953—T. Welton.
Signals—1993—J. Johnson, E. Shinn, and G. Ragg.
Skirts, ladies'—1893—H. A. Lyman.
Soap, gauging and cutting—1866—E. Whele.
Soda water, &c., manufacture of—1949—W. E. Newton.
Steam engines—1966—H. Ruddick.
Steam engines—1974—W. C. Church.
Straps, elastic—1970—C. D. Abel.
Tapers, making—1907—J. J. Lane.
Telegraphic apparatus—2015—W. S. Andrews.
Tobacco pipes—1977—R. Tiernan.
Traction engines—1999—N. Clayton and J. Shuttleworth.
Tubes, connecting, &c.—1987—N. Thompson.
Tubes, metal—1973—W. R. Lake.
Tubes, welded—1937—W. Galloway and G. Plant.
Tuyeres for smiths' hearths—1876—M. H. Taylor.
Tyres for railway wheels—1981—H. B. Woodcock.
Umbrellas, apparatus for carrying—1951—E. M. Brown.
Valves—1940—W. S. Scott and W. H. Steel.
Valves—2001—N. Clayton and J. Shuttleworth.
Venetian blinds—1919—P. Ironside.
Vessels, propelling—1943—H. Clarke.
Washing, &c., machines—1968—E. O. Greening and J. Atkinson.
Water-closet fittings—1978—T. C. Thomas.
Wells, apparatus for sinking—1916—J. Chaudron.
Wire netting, folding—1891—G. K. Geyelin.
Wrenches—1894—J. G. Tongue.
Yarns, &c., printing—1925—T. and J. Wood.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Boots and shoes—2035—J. H. Johnson.
Mines, raising and lowering persons, &c., in—2044—E. H. Bernier.
Pulley and chain gearing—2073—T. Wrigley.
Railways—2089—H. A. Bonneville.

PATENTS SEALED.

147. R. Harlow.
150. W. E. Gedge.
152. J. Rowley.
154. J. Edwards.
163. J. Northrop and S. and W. H. Tetley.
168. C. Coleman.
174. T. Ross.
194. F. H. McLauchlan.
196. W. Gray.
205. S. Carey.
211. J. J. Lundy.
290. J. G. Robinson.
393. W. Clissold.
440. R. Thwaites, E. H. Carbutt, and J. Sturgeon.
1150. J. Millward.
1404. J. Watkins.

From Commissioners of Patents' Journal, July 23rd.

PATENTS SEALED.

178. F. Palmer.
180. T. Taylor.
181. C. E. Brooman.
186. G. B. Woodruff.
200. J. Clark.
203. H. Boys.
208. P. Jensen.
209. M. H. Lishman and E. Chambers.
216. J. Taylor.
219. G. Haseltine.
221. E. H. Waldenstrom and I. G. Bass.
228. G. Haseltine.
244. W. E. Newton.
254. B. Hunt.
255. B. Hunt.
267. J. H. Johnson.
271. D. A. Halket.
307. J. F. Philippi.
331. C. E. Brooman.
362. J. H. Johnson.
396. A. V. Newton.
405. S. D. Mack.
540. T. Humphreys.
1012. S. Perkins.
1181. A. V. Newton.
1366. S. W. Worssam.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

1778. J. Chalmers.
1797. P. G. B. Westmacott.
1807. G. P. Harding.
1822. N. Salamon.
1799. A. Espirat and E. Sause.
1802. T. Bourne.
1813. W. E. Newton.
1873. W. Anderson.
1804. H. E. F. De Brion.
1812. J. Coton.
1855. T. Dixon.
1809. J. Laubereau.
1841. F. Gregory.
1849. J. Jeffreys.
1861. A. Wydler.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

1750. A. B. Woodcock.
1804. H. C. Ash.
1764. C. C. J. Guffroy.
1754. J. Saxby.
1769. J. H. Young.
1795. W. E. Taylor.
2015. E. Hall.

Journal of the Society of Arts.

FRIDAY, AUGUST 2, 1867.

Announcements by the Council.

Society's Visit to the Paris Exhibition.

Arrangements have been made for the visit of the members to the Universal Exhibition, 1867, as follows :—

The visit will extend from Monday, the 29th of July, to Friday, the 16th of August.

A Reception Room has been provided for the use of the members at No. 43, Rue Saint Georges, where members can have their letters addressed, where they can write their letters, make appointments and arrangements, and where notices of any special matters connected with the visit will be suspended. Members are requested to register their names and addresses here on their arrival in Paris. Lists of Hotels and Lodgings will be provided.

Arrangements have been made by which the Members of the Society of Arts will, through the kindness of the proprietors, be admitted, on the presentation of their cards of membership, to inspect Imperial and Municipal establishments, factories, and workshops in the following list:—

His Excellency the Minister of Public Instruction has most kindly arranged for the Members visiting the Lycées of Paris, and has also further favoured the Society with tickets to view the exhibition of the works of the pupils in the Communal schools, and of the collections made by the Scientific Commission of Mexico.

The Director of the Imperial Mint (La Monnaie) has given instructions that members of the Society, when provided with their cards, which will be prepared for the purpose, shall be admitted to that establishment on Tuesdays and Fridays, at three o'clock.

The Director of the Imperial Observatory has arranged that the Members presenting their cards of membership at that establishment shall be admitted on Saturdays, between half-past two and four o'clock.

Monsieur le Senateur, Prefect of the Seine, has politely promised to make proper arrangements for the visits of the members to the catacombs, sewers, and municipal establishments.

Through the kindness of M. Belgrand, the water engineer to the City of Paris, permission has been obtained for members to visit the Waterworks of the City of Paris at Menilmontant, on any day to the 5th August inclusive.

The Director of the Public Ways and Promenades of the City of Paris has thrown open the horticultural and other municipal establishments in his department, and has most obligingly tendered his assistance to the members.

M. Le Play, Commissaire-General of the Universal Exhibition, has very kindly expressed his desire to aid the members in any way in his power.

The following gentlemen and companies have politely opened their establishments to the Society:—

MM. J. F. Cail and Cie., engineers, Quai de Billy, No. 48, and Grenelle. Any day of the week, from 6 to 11 a.m., and from 12 to 5.

M. F. Barbedienne has furnished tickets of admission to visit his bronze foundry and workshops, 63, Rue de Lancry, on any day in the week, from 6 a.m. to 5 p.m.

MM. Barbezat and Cie., foundries, 58, Boulevard Prince Eugene, and 95 and 97, Rue Richard-Lenoir. Open to the members without restriction as to the day or hour.

MM. Ch. Christofle and Cie., gold and silversmiths, 56, Rue de Bondy, will receive a party of the members on any day appointed by the Society, between 12 and 2 o'clock.

MM. Hachette and Cie.'s great publishing establishment will be open to members on any day, between half-past 8 and 11 o'clock, by presenting their cards to M. Fouret, a member of the firm.

M. Ch. Lahure, Imprimerie Générale, 9, Rue de Fleurus, on any day and at any hour, except between 12 and 2 o'clock.

MM. A. Chaix and Cie., printing establishment, 20, Rue Bergère, on Friday in each week.

MM. Mazaroz-Ribaillier and Cie., furniture manufacturers, Exhibition rooms, 20, Boulevard des Filles de Calvaire; manufactory, 4 and 6, Rue Ternaux Popincourt, freely open to the members.

The Directors of the Compagnie du Chemin de Fer de Paris à Orleans have given leave for the members to visit their new passenger station and goods station, on presenting their cards of membership to M. Renault, Chief Architect of the Company, No. 1, Boulevard de l'Hôpital; or to M. Prevel, 42, Quai de la Gare; according as they desire to see the passenger station or the goods station.

The workmen's houses designed by H.I.M. the Emperor Napoleon III., and now in course of construction in concrete by Messrs. W. E. Newton (member of the Society) and E. C. Shepard, in the Avenue Daumesnil, near the Parc de Vincennes, may be inspected any day from 6 a.m. till 6 p.m. Mr. E. Newton, the resident engineer, is usually at the works from 10 till 4, but in his absence the foreman, M. Bourgignon, or his deputy, will afford members any information they may require.

Nothing could exceed the politeness with which the various gentlemen have met the requests of the Society, and there is no doubt that in a day or two several other establishments will be added to the list.

Cards of membership, enabling members to take advantage of these arrangements, may be obtained on application to the Society's House, John-street, Adelphi, or at 43, Rue Saint Georges, Paris.

P. Le Neve Foster, *Secretary.*

The following list of hotels will be found useful:—

In the neighbourhood of the Tuileries.

Hôtel Meurice, 228, Rue de Rivoli.
„ Windsor, 226, „
„ Brighton, 218, „
„ Wagram, 208, „
„ Rivoli, 202, „
„ du Louvre, 166, „

On or near the principal Boulevards.

Grand Hôtel, 12, Boulevard des Capucines.
Grand Hôtel des Capucines, 37, Boulevard des Capucines.
Hôtel Scribe, 1, Rue Scribe.
„ de Bade, 32, Boulevard des Italiens.
„ du Tibre, 8, Rue du Helder.
„ du Helder, 9, Rue du Helder, Boulevard des Italiens.
„ Brezil, 16, Rue du Helder.
„ de Lancastre, 22, „
„ de l'Amirauté, Rue Neuve Saint Augustin.
„ Choiseul, 7, Rue de Choiseul.
„ des Deux Mondes, 8, Rue d'Antin.
„ des Etats Unis, 16, Rue d'Antin.
„ de la Grande Bretagne, 14, Rue Caumartin.

Rue St. Honoré, &c.

Hôtel de Lille et d'Albion, 223, Rue St. Honoré.
„ St. James, 211, Rue St. Honoré.
„ Choiseul, 241, Rue St. Honoré.
„ du Danube, 11, Rue Richepance.
„ Richepance, 14, Rue Richepance, near the Madeleine.
„ de l'Amirauté, 20, Rue Duphot.

Rue de la Paix, Place Vendôme, &c.

Hôtel de la Paix, 32, Rue de la Paix.
„ Westminster, 11, Rue de la Paix.
„ Mirabeau, 8, „
„ Bristol, 5, Place Vendôme.
„ du Rhin, 4, Place Vendôme.
„ Castiglione, 12, Rue Castiglione.

Palais Royal and Bourse.

Hôtel des Etrangers, 3, Rue Vivienne.
Grand Hôtel de France et d'Angleterre, 72, Rue Richelieu.
Hôtel d'Angleterre, 56, Rue Montmartre.
„ Bergère, 32, Rue Bergère.
Grand Hôtel de la Marine, 3, Rue des Vieux Augustins.
Grand Hôtel d'Albion, 20, Rue Bouloi.
Hôtel Bouloi, 5, Rue Bouloi.
Grand Hôtel de la Bourse, 15, Rue Nôtre Dame des Victoires.

Neighbourhood of the Northern Railway.

Hôtel de Chemin de fer du Nord, opposite the Railway Station.
Grand Hôtel du Nord, 45, Rue Lafayette.
Grand Hôtel de Strasbourg, 78, Boulevard de Strasbourg.
Hôtel Violet, Passage Violet, Faubourg Poissonnière.

Between the Western Railway Station and the Madeleine.

Hôtel des Etrangers, 24, Rue Tronchet.
„ Tronchet, 22, „
„ Folkestone, 9, Rue Castellane.
„ Bedford, 17, Rue de l'Arcade.
„ de l'Arcade, 43, Rue de l'Arcade.
„ Navarin, Rue Navarin.

South Side of the Seine.

Hôtel d'Amsterdam, 59, Rue Saint André des Arts.
„ des Beaux Arts, 1, Rue Beaux Arts.
„ Bretagne, 20, Rue de Seine.
„ „ 46, St. André des Arts.
„ de Breteuil, 1, Rue Dauphin.
„ Clovis, 69, Rue Monsieur le Prince.
„ Suffren, Avenue Suffren, Champ de Mars.

Railways and Steamboats.—The terminus of the Auteuil and Exhibition Railway is at the Western Station, Place du Havre. 2nd class carriages only 50c., intermediate stations 40c. Trains leave the terminus at 27 minutes, and the Exhibition at 25 minutes past each hour; there is an extra up train at 5·57. The Circular Railway (Chemin de Fer de Ceinture) has stations all round Paris, and joins the preceding at Auteuil. The large omnibuses of the American Railway run from the Bourse, and carry passengers for the Exhibition to the Pont d'Alma. Steamboats run from the Place de la Concorde every quarter of an hour for the Exhibition. Landing stage on the Paris side of the Pont de Jena. Other steamboats ply between the Champ de Mars and the Ile de Billancourt. Landing stage on the lower side of same bridge.

Numbers of Houses in Streets.—Even Nos. on right side, odd Nos. on left side of street, progressing in direction of the stream of the river, or commencing from the river in transverse streets.

Poste Restante.—Letters addressed "Poste Restante" to be applied for at the head post-office, 9, Rue Jean-Jacques Rousseau; but members can have their letters addressed to No. 43, Rue St. Georges.

Cab Fares in Paris.—Two kinds of cabs—single seat for two; double seat for four.

Fare either by the "hour" or the "course," at the option of the hirer ("course" any distance without stoppage).

Fares—Two-place cab, 2f. per hour; 1·50f. per course; four-place cab, 2·25f. per hour; 1·70f. per course.

Driver's usual gratuity, 5 sous per hour; 3 or 4 sous per course.

Extra charge between 12·30 night and 6 morning.
„ „ when taken from "Remise" (coach-house).
„ „ beyond the fortifications.
„ „ for luggage.

Ticket containing full particulars of authorised charges always to be given by the driver on entering his cab.

Omnibus Fares.—30 centimes (3d.), inside; 15 centimes (1½d.), outside.

Money.—Gold:—20 francs, 10 francs, and 5 francs. Silver:—2 francs, 1 franc, ½ franc, and 20 centimes. Copper:—10 centimes (2 sous) = 1d.; 5 centimes (1 sou) = ½d. £1 = 25 francs, usual exchange.

Artizans' Visit to Paris.

Her Majesty's Government have granted to the Society of Arts, in aid of the fund now being raised by the Society for assisting workmen, specially selected from various trades, to visit and report on the Paris Exhibition, the sum of £500, conditional on the Society raising a like amount by public subscription.

The following is the list of subscriptions up to the present date:—

H.R.H. the Prince of Wales, President	£31	10	0
Her Majesty's Government (conditional)	500	0	0
Society of Arts	105	0	0
Earl Granville, K.G.	5	0	0
Lord de L'Isle	10	0	0
Thomas Twining	2	2	0
Sir J. P. Boileau, Bart.	5	0	0
George Godwin, F.R.S.	1	1	0
Vice-Chancellor Sir W. Page Wood, F.R.S.	10	0	0
W. H. Bodkin (Assistant-Judge)	3	3	0
Sir Rowland Hill, K.C.B.	3	3	0
Benjamin Shaw	2	2	0
Alfred Davis	10	10	0
Eugène Rimmel	5	5	0
Frederick Mocatta	2	2	0
James Marshall	2	2	0
Robert Dawbarn	1	0	0
Henry Vaughan	10	10	0
Philip Sancton	5	0	0
Somerset A. Beaumont	5	0	0
Decimus Burton, F.R.S.	1	0	0
W. Botly	1	1	0
Professor Robert Bentley	2	2	0
John Stuart Mill, M.P.	1	1	0
G. F. Wilson, F.R.S.	2	2	0
Henry Creed	1	1	0
The Marquis of Salisbury, K.G.	10	0	0
D. Roberton Blaine	2	2	0
William Hawes	2	2	0
Seymour Teulon	1	1	0
G. N. Hooper	2	2	0
Lord Taunton	5	0	0
Henry Cole, C.B.	1	0	0
A. Robb	1	1	0
S. Andrews	1	1	0
Thomas Dixon	1	1	0
Charles Telford	1	1	0
Edmund Burke	2	0	0
W. H. Gore Langton, M.P.	5	0	0
J. R. Fowler	1	0	0
John Rutson	1	1	0
W. Fothergill Cooke	2	2	0
J. P. Gassiot, F.R.S.	5	5	0
The Duke of Devonshire	10	0	0
Messrs. Chawner and Co.	2	2	0
Chas. Brooke, F.R.S.	1	1	0
T. Chappell	2	2	0
C. Candy	2	0	0
Alfred Haines	2	2	0
Major-General Sir William Gordon, K.C.B.	2	2	0
Bartlett Hooper	2	2	0
F. Richardson	1	1	0
Carry forward	£796	8	0

Brought forward	£796	8	0
J. Sharples	3	3	0
Henry Johnson	2	2	0
C. Skipper, jun.	1	1	0
G. T. Saul	1	1	0
Alderman D. H. Stone	5	5	0
G. H. Walker	1	1	0
R. Worthington	2	2	0
A. W. Miles	2	2	0
J. Harris Heal	2	2	0
John Bell	1	0	0
Messrs. Mander and Co.	2	2	0
B. S. Cohen	1	1	0
John Corbett	1	1	0
J. Zaehnsdorf	0	10	6
Major-General Viscount Templetown, C.B.	5	0	0
J. Pearce	3	3	0
Messrs. Huntley and Palmer	2	2	0
A. Glendining, jun.	1	1	0
A. Trevelyan	2	2	0
S. Harrington	1	1	0
Montague Ainslie	2	2	0
James Bentley	2	2	0
Capt. R. P. Oldershaw	1	0	0
E. C. Tufnell	2	2	0
Samuel Redgrave	1	1	0
Joseph Lockett	2	2	0
Messrs. Spicer, Bros.	4	4	0
John Tolhurst	1	1	0
Lord Ebury	5	0	0
C. Lawson	1	0	0
John Horton	1	1	0
W. Baker	1	1	0
Henry Briggs	1	1	0
James Heather	1	1	0
H. Reader Lack	1	1	0
C. Silvy	1	1	0

Collected in response to a Circular issued by the Birmingham Chamber of Commerce.

G. Dixon, M.P., Birmingham	5	5	0
Messrs. Smith and Wright, Birmingham ..	5	5	0
Messrs. Griffiths and Browett, Birmingham ..	5	5	0
Henry Weiss, Birmingham	2	2	0
W. H. M. Blews, Birmingham	2	2	0
W. Middlemore, J.P., Birmingham	5	5	0
Thomas Lloyd, Birmingham	2	2	0
Messrs. Elkington and Mason, Birmingham ..	5	5	0
Messrs. John Hardman and Co., Birmingham	2	2	0
Messrs. F. and C. Osler, Birmingham ..	5	5	0
The Proprietors of the *Birmingham Journal and Daily Post*	2	2	0
The Proprietors of the *Birmingham Gazette* ..	2	2	0
R. L. Chance, Birmingham	2	2	0
T. Avery, Birmingham	2	2	0
W. Tonks and Sons, Birmingham	2	2	0
W. Lucas Sargant, Birmingham	2	2	0
— Mountain (Messrs. Walter, May, and Co.), Birmingham	2	2	0
J. A. Williams, Birmingham	2	2	0
Henry Charlton, Birmingham	2	2	0
W. Bartlett and Sons, Birmingham	5	0	0
John P. Turner, Birmingham	0	10	6
W. H. Avery, Birmingham	2	2	0
Messrs. Peyton and Peyton, Birmingham ..	3	3	0
James Cartland, Birmingham	2	2	0
Messrs. Smith and Chamberlain, Birmingham	2	2	0
Messrs. Baker and Son, Birmingham ..	2	2	0
Messrs. Hinks and Wells, Birmingham ..	2	2	0
Messrs. Van Wart and Co., Birmingham ..	5	0	0
Messrs. Evans and Askin, Birmingham ..	2	2	0
C. Shaw, Birmingham	2	2	0
James Barwell, Birmingham	1	1	0
Total	£952	15	0

Messrs. J. M. Johnson and Sons have kindly placed at the disposal of the Council a number of their five-shilling English Catalogues of the Exhibition, sufficient to present each workman with a copy.

Subscriptions may be forwarded to the Financial Officer, at the Society's House.

The Council are now prepared to receive the names of any workmen recommended by their respective trades as fit and proper persons to undertake this important duty on behalf of their fellow workmen.

Prizes for Art-Workmen.*

The Council of the Society of Arts hereby offer Prizes for Art-Workmanship, according to the following conditions :—

I. The works to be executed will be the property of the producers, but will be retained for exhibition, in London and elsewhere, for such length of time as the Council may think desirable.

II. The exhibitors are required to state in each case the price at which their works may be sold, or, if sold previously to exhibition, at what price they would be willing to produce a copy.

III. The awards in each class will be made, and the sums specified in each class will be paid, provided the works be considered of sufficient merit to deserve the payment; and, further, in cases of extraordinary merit additional awards will be given, accompanied with the medal of the Society.

IV. Before the award of prizes is confirmed, the candidates must be prepared to execute some piece of work sufficient to satisfy the Council of their competency.

V. *Bona-fide* Art-workmen only can receive prizes.

VI. Although great care will be taken of articles sent for exhibition, the Council will not be responsible for any accident or damage of any kind occurring at any time.

VII. Prices may be attached to articles exhibited and sales made, and no charge will be made in respect of any such sales.

VIII. All the prizes are open to male and female competitors, and in addition, as regards Painting on Porcelain, Cameo-cutting, Engraving on Glass, Decorative Painting, and Wall Mosaics, a second set of prizes, of the same amounts, will be awarded among female competitors. If a female desire to compete in the female class only, she must declare her intention accordingly. The originals of the works prescribed may be seen at the South Kensington Museum.

IX. Any producer will be at liberty to exhibit, either in his own name or through his workmen, any work or works as specimens of good workmanship, in the various classes, provided that the work or works be accompanied with a statement of the name or names of the artizans who executed their respective portions; and if the work or works be sufficiently meritorious, extra prizes will be given to the artizans who have executed them.

X. Artizans may, if they think fit, exhibit works executed by them after other designs than those stated above, in any of the classes. Such works may contain the whole or portions of the prescribed designs, and must

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* The Worshipful Company of Salters contribute £10 annually to this prize fund. The Worshipful Company of Goldsmiths contribute £15 "for the encouragement of workmen in the precious metals." Particulars of the Goldsmiths' Company's prizes are given. The North London Exhibition prize consists of the interest of £167 7s. 3d., invested in the name of the Society of Arts, to be awarded by the Council "for the best specimens of skilled workmanship" at the Society's Exhibition of the works sent in for the prizes named above.

be of a similar style and character. Competitors must specify the class in which they exhibit. If the works be sufficiently meritorious extra prizes will be awarded.

XI. All articles for competition must be sent in to the Society's house on or before Saturday, the 21st of December, 1867, and must be delivered free of all charges. Each work sent in competition for a Prize must be marked with the Art-workman's name, or, if preferred, with a cypher, accompanied by a sealed envelope giving the name and address of the Art-workman. With the articles, a description for insertion in the catalogue should be sent. The works will be exhibited at the Society's House, and afterwards at the South Kensington Museum.

Casts may be seen at the Society of Arts, Adelphi, London, and the Schools of Art at Edinburgh, Dublin, Manchester, Glasgow, Birmingham, and Hanley in the Potteries.

Photographs and rough casts in metal, &c., may be purchased at the Society of Arts, John-street, Adelphi, at the prices named.

The plaster casts of the examples in classes 2 and 4 (except bas-relief 4*a*) may be obtained from Mr. Franchi, 15, Myddelton-street, Clerkenwell, E.C.; the other casts from Mr. D. Brucciani, Galleria delle Arti, 40, Russell-street, Covent-garden, W.C.

*** The Council are happy to announce that several of the works which received first prizes in the competitions of 1863, 1864, 1865, 1866, and 1867, have been purchased by the Department of Science and Art, to be exhibited in the South Kensington Museum and the Art Schools in the United Kingdom.

FIRST DIVISION.

Works to be Executed from Prescribed Designs.

For the successful rendering of the undermentioned designs in the various modes of workmanship according to the directions given in each case.

Class 1.—Carving in Marble, Stone, or Wood.

(*a.*) *The Human Figure.*—One prize of £15 for the best, and a second prize of £7 10s. for the next best, work executed in marble or stone, after part of a frieze of a chimney-piece, by *Donatello*, No. 5,795, in the South Kensington Museum; or a relievo in terra cotta, Amorini supporting an entablature; original in the South Kensington Museum, No. 11,940. Dimensions—Two-thirds the size of the cast (linear).—The design may be adhered to strictly or adapted to any architectural purpose.

[Cast—Fifteen Shillings; Photograph—One Shilling.]

(*b.*) *Ornament.*—One prize of £10 for the best, and a second prize of £5 for the next best work, executed in marble, stone, or wood after a carved chair-back in the South Kensington Museum. Dimensions—To be two-thirds of the cast (linear).

[Cast—Twelve Shillings. Photograph—One Shilling.]

(*c.*) *Ornament.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed in stone, after a *Gothic bracket* in the Architectural Museum. Dimensions the same as the cast. In this design the details may be improved by the introduction of small animals, and the human head may be changed according to the taste of the art-workman.

[Cast—Ten Shillings; Photograph—One Shilling.]

(*d.*)—One prize of £20 for the best, and a second prize of £10 for the next best, work carved in *wood* after a panel in carved oak. Original in South Kensington Museum, No. 274. Dimensions—Optional.

[Photograph—Sixpence.]

(*e.*)—One prize of £15 for the best, and a second prize of £7 10s. for the next best, work carved in *wood* after the entablature of a chimney-piece carved in wood, in the South Kensington Museum, No. 85.'64. Dimensions—Same size as original.

[Photograph—One Shilling.]

(*f.*) *Ornament.*—One prize of £10 for the best, and a second prize of £5 for the next best, work carved in wood after an *Italian picture frame* in the possession of Henry Vaughan, Esq. Dimensions optional.—This design may be adhered to strictly or adapted in such manner as the workman may think fit.

[Photograph—Two Shillings.]

(*g.*) *Ornament carved and gilt.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed in wood, carved and gilt after a *Console Table* in the South Kensington Museum, No. 6,497, of the period of Louis XVI. The work to be carved roughly in wood, then to be prepared in the white by a gilder, then cut up or carved in the white by the carver, then to be gilt in mat and burnished gold. As such work may probably be executed by two persons, the prize will be apportioned as the judges may determine.

[Photograph—One Shilling.]

Class 2.—Repoussé Work in any Metal.

(*a.*) *The Human Figure as a bas-relief.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after the Martelli Bronze Mirror Case, No. 8,717, in the South Kensington Museum—dimensions, 6¾ inches diameter; or a panel in low relief, the Virgin and Child, in South Kensington Museum, No. 66.'66. Dimensions—One-third of original.

[Cast of Mirror Case—Two Shillings; Photograph—One Shilling. Cast of Bas-relief, 3s. 6d.

(*b.*) *Ornament.*—One prize of £5 for the best, and a second prize of £3 for the next best, work executed after a tazza in silver, date 1683, the property of Sir W. C. Trevelyan, Bart., now in the South Kensington Museum. Dimensions—The same as the model.

[Photograph—One Shilling.]

Class 3.—Hammered Work, in Iron, Brass, or Copper.

Ornament.—One prize of £7 10s. for the best, and a second prize of £5 for the next best, work executed after a knocker in wrought iron, in the South Kensington Museum, No. 9,007.

If the work is executed in brass or copper, it should be rendered subject to the conditions of these metals, either as split and riveted or partly beaten from the sheet, and the awards will be made in view of these conditions. The work must not be covered with colour or any coating which masks the workmanship.

[Photograph—One Shilling and Threepence.]

Class 4.—Carving in Ivory.

(*a.*) *Human Figure in the round.*—One prize of £15 for the best, and a second prize of £10 for the next best, work executed after an ivory plaque of Silenus and Amorini, by *Fiamingo*, No. 1,059, in the South Kensington Museum; dimensions—five inches greatest length; or after a relievo in marble, the Virgin and Child, No. 4,233 in the South Kensington Museum. Dimensions—To be reduced in height by one-third (linear).

[Cast of the Plaque—Two Shillings; and Photograph of the Virgin and Child—One Shilling each.]

(*b.*) *Ornament.*—One prize of £7 10s. for the best, and

a second prize of £5 for the next best, work executed after an ivory crozier head, in the South Kensington Museum, No. 214.'65. Dimensions—The same as the cast.

[Cast—One Shilling.]

Class 5.—Chasing in Bronze.

(*a.*) *The Human Figure.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a panel in low relief, the Virgin and Child, in the South Kensington Museum, No. 66'66.

A rough casting in bronze, on which the chasing must be executed, will be supplied by the Society at cost price.

[Plaster Cast—Three Shillings and Sixpence.]

(*b.*) *Ornament.*—One prize of £10 for the best, and a second prize of £7 10s. for the next best, work executed after a silver gilt missal cover, in the South Kensington Museum, No. 2,639.

[Photograph—One Shilling.]

Class 6.—Etching and Engraving on Metal—Niello Work.

Prizes of the Goldsmiths' Company.

Ornament.—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after arabesques by Lucas Van Leyden, A.D. 1528. No. 18,968 in the South Kensington Museum. To be engraved the height of the photograph, and, if round a cup or goblet, repeated so as to be not less than nine inches in length when stretched out.

[Photograph—Sixpence.]

Class 7.—Enamel Painting on Copper or Gold.

(*a.*) *The Human Figure.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a panel in low relief, the Virgin and Child, in the South Kensington Museum, No. 66.'66. Ground to be blue. Dimensions—Half size of original.

[Photograph—One Shilling; Cast, Three Shillings and Sixpence.]

(*b.*) *Ornament.*—One prize of £5 for the best, and a second prize of £3 for the next best, work executed after the back of a plate, No. 8,428, in the South Kensington Museum. Ground to be blue. Dimensions—The same as the Photograph.

[Photograph—Sixpence.]

Class 8.—Painting on Porcelain.

(*a.*) *The Human Figure.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a photograph of a drawing by *Raphael*, No. 20 in the South Kensington Museum. Dimensions—The same as the Photograph. This work is to be coloured according to the taste of the painter.

[Photograph—Ninepence.]

(*b.*) *Ornament.*—One prize of £5 for the best, and a second prize of £3 for the next best, work executed after a photograph of ornament by *Aldegrever*, No. 2,118 in the South Kensington Museum, and coloured according to the taste of the painter, with a gold ground. Dimensions—Double the size of the Photograph (linear).

[Photograph—Sixpence.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

Class 9.—Decorative Painting.

(*a.*) *Ornament.*—One prize of £5, and a second prize of £3, for a work, executed after a photograph of ornament by *Aldegrever*, in the South Kensington Museum, No. 2,118. Dimensions—length, 3 feet.

[Photograph—One Shilling.]

(*b.*) *Ornament.*—One prize of £5, and a second prize of £3, for a work, executed after a *picture frame*, in the South Kensington Museum, No. 7,820. Dimensions—5 feet by 3 feet 11½ inches, outside measure. The works to be executed on canvass, either with or without stretchers, in cool colours. Some lines of the mouldings may be gilt.

[Photograph—One Shilling and Sixpence.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

Class 10.—Inlays in Wood (Marquetry, or Buhl), Ivory or Metal.

Ornament.—One prize of £5 for the best, and a second prize of £3 for the next best, work executed after a guitar inlaid with ivory, ebony, and mother-o'-pearl. The ornament to be of the same dimensions as the original, but may be applied to any object. No. 9,611 in the South Kensington Museum.

[Photograph—Sixpence.]

Class 11.—Cameo Cutting.

(*a.*) *Human Head.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a bust of *Clytie* in the British Museum—The head only.

[Cast of the Head—Five Shillings.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

Class 12.—Engraving on Glass.

Ornament.—One prize of £10 for the best, and a second prize of £3 for the next best, work executed after arabesques by Lucas Van Leyden, A.D. 1528. No. 18,968 in the South Kensington Museum. To be engraved the height of the engraving; and if round a glass or goblet, repeated so as not to be less than 9 inches long when stretched out.

[Photograph—Sixpence.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

Class 13.—Wall Mosaics.

Human Head.—One prize of £10 for the best, and a second prize of £7 10s. for the next best, work executed after a *Female Head* (over the lame cripple) in the cartoon of the "Beautiful Gate." The dimensions of the work should be regulated by the size of the tesseræ proposed to be used, which size may be left to the choice of the artist. Although desirable, it is not necessary to execute the whole subject in actual mosaic. The original is at the South Kensington Museum. Tesseræ of two sizes may be obtained from Messrs. Minton, Stoke-upon-Trent; Messrs. Maw and Co., Brosely, Shropshire; Messrs. Powell and Sons, Temple-street, Whitefriars; and Messrs. Jesse Rust and Co., Carlisle-street, Lambeth.

[Photograph—One Shilling.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

Class 14.—Gem Engraving.

(*a.*) *Human Head.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a cameo portrait of Savonarola, No. 7,541 in the

South Kensington Museum. Dimensions—The same as the cast.

[Cast—Sixpence.]

(*b.*) *Full-length Figure.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a small Wedgwood medallion, No. 5,827 in the South Kensington Museum. Dimensions—The same as the cast.

[Cast—Sixpence.]

CLASS 15.—DIE SINKING.

Human Head.—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a Wedgwood Medallion in the South Kensington Museum, No, 3,470. Dimensions—

[Photograph—Sixpence.]

CLASS 16.—GLASS BLOWING.

Ornament.—One prize of £7 10s. for the best, and a second prize of £5 for the next best, work executed after an original in the South Kensington Museum, No. 6,785. Dimensions—As given in the wood engraving.

[Photograph—Sixpence.]

CLASS 17.—BOOKBINDING.

(*a.*) *Bookbinding.*—One prize of £7 10s. for the best and a second prize of £5 for the next best, work executed in bookbinding, after a specimen in the South Kensington Museum, No. 16,460. The work to be bound should be some classical author of the size given. Dimensions—The same as the photograph.

[Photograph—One Shilling.]

CLASS 18.—EMBROIDERY.

Ornament.—One prize of £5 for the best, and a second prize of £3 for the next best, work executed, either after *Two Angels* in an example in the South Kensington Museum, No. 1194.'64, or an Italian Silk in the South Kensington Museum, No. 7,468, which may be adapted to a screen. Dimensions—According to the taste of the embroiderer.

[Photograph—German, Sixpence; Italian, One Shilling.]

CLASS 19.—ILLUMINATIONS.

Ornament.—One prize of £5 for the best, and a second prize of £3 for the next best, copy made from an Altar Card, attributed to Giulio Clovio, in the South Kensington Museum, No. 2,958, or from a MS. border, date 1450, No. 3,057, in the South Kensington Museum. Dimensions—One-half larger than the Photograph (linear).

[Photograph—Two Shillings.]

SECOND DIVISION.

CLASS 20.—WOOD CARVING.

(*a.*) *Human figure in the round, in alto or in bas relief. Animals or natural foliage may be used as accessories.* 1st prize of £25 and the Society's Silver Medal. 2nd prize of £15. 3rd prize of £10.

(*b.*) *Animal or still-life. Fruit, flowers, or natural foliage may be used as accessories.* 1st prize of £10. 2nd prize of £7 10s. 3rd prize of £5.

(*c.*) *Natural foliage, fruit, or flowers, or conventional ornament, in which grotesque figures or animals may form accessories, preference being given where the work is of an applied character for ordinary decorative purposes, as representing commercial value.* 1st prize of £10. 2nd prize of £7 10s. 3rd prize of £5.

(By order)
P. LE NEVE FOSTER, *Secretary.*

Proceedings of the Society.

FOOD COMMITTEE.

ADULTERATION OF FOOD.

Through the kindness of Lord Stanley, the following information has been furnished to the Committee in reference to the laws concerning the adulteration of food in Norway and Denmark:—

NORWAY.

Criminal Code, Cap. 21, *par.* 3, *sec. C.*

Anyone who, with intent to defraud, sells goods knowing the same to be adulterated, shall be liable to punishment with imprisonment, or hard labour of the 5th class (I.).

Criminal Code, Cap. 21, *par.* 4.

Anyone who with intent to defraud sells articles of food adulterated with matter injurious to health shall be punished with hard labour of the 5th class.

Criminal Code, Cap. 21, *par.* 5.

If the offence named in section C be committed as regards food or medicines, or anything appertaining to the sustenance of man, and the offender is aware that any portion of the same be composed of matter injurious to health, whether it be employed during its manufacture, or be added subsequently, shall be punished with hard labour of the 4th (2) or 5th class.

Be the offender a merchant, or person earning his livelihood by preparing or vending such goods, he shall be liable to lose his license; and should any one's health be impaired, or life be sacrificed to the culpability of such offender, he shall, in the first instance, be liable to hard labour of the 2nd class (3) or 3rd class (4), and in the latter instance to hard labour of the 1st (5) or 2nd class.

CONCERNING THE USE OF FALSE WEIGHTS OR MEASURES.

The manufacture and sale of proper weights and measures is under control publicly instituted; and all weights and measures must consequently be adjusted, and subsequently stamped. At least once during each year, or as often as there may be reasons for so doing, it shall be the duty of the head of the police force of each town to inspect such weights and measures in use.

For further particulars see paragraphs 18—22 of the Law of July 28th, 1824, copies of which are subjoined. Penalties therein are still in force.

Criminal Code, Cap. 2, *par.* 4.

Whosoever shall be guilty of feloniously counterfeiting the stamps or marks used by the authorities for marking or stamping weights and measures shall be punished with hard labour of the 4th or 5th class.

Criminal Code, Cap. 2, *par.* 5.

Whosoever uses weights or measures knowing them to be counterfeited, as above cited, shall be liable to hard labour of the 4th or 5th class.

Criminal Code, Cap. 2, *par.* 6.

Whosoever shall manufacture articles, specified in paragraph 4, namely, stamps or marks, but without criminal intent, shall be liable to a fine or imprisonment.

Criminal Code, Cap. 21, *par.* 4.

Whosoever, with intent to defraud, uses for purposes of trade or otherwise, weights or measures of improper dimensions, shall be punished with hard labour of the 5th class.

Whosoever, without intent to defraud, uses unadjusted weights or measures for purposes of trade, or otherwise, shall be liable to a fine and the confiscation of the goods thus weighed or measured; and whosoever uses weights or measures which he knows to have been adjusted, but which have subsequently been tampered with, shall be liable to a fine, if acquainted with the circumstance.

Such weights and measures shall be deemed unfit for further use; should, however, the party to whom they belong promise to readjust the same, this restriction may be modified.

In accordance with ancient and hitherto enforced regulations, all fish, and preparations of the same, were bound to be inspected, and subsequently stamped, as to quality, and barrels were opened with a view to inspect the quantity therein contained. This inspection was formerly obligatory, but by the decree of September 15, 1851, the necessity of such inspection has been removed. For the town of Bergen there are still regulations for the inspection of herrings for exportation.

Punishments Referred to in the Foregoing.

(1). From six months to three years.
(2). Three years, and not exceeding six years.
(3). Seven years, and not exceeding twelve years.
(4). Six years, and not exceeding nine years.
(5). For life.

Denmark.

Copenhagen, April 25, 1867.

My Lord,—In compliance with the instructions contained in your lordship's despatch, No. 3, of the 2nd instant, I have the honour to transmit to your lordship herewith, copy, together with translation, of two paragraphs of the Danish Criminal Code, referring to frauds by the use of false weights and measures and by adulteration of articles of food.

I should add that there is a local board established in Copenhagen, whose duty it is to attend to all matters concerning the sanitary conditions of the town, and whose power extends to the examination of every article of food brought to market.

I have, &c.,
(Signed) F. C. Ford.

To Lord Stanley.

Paragraph 277 *of the Danish Criminal Code.*

Any one who fraudulently makes false measures or weights, or alters proper measures or weights, also any one who uses such false instruments for the purpose of deceiving others, shall be punished with imprisonment, with bread and water, for a period not less than five days, or with labour in the House of Correction for a period not exceeding two years. Under special circumstances of an aggravated nature, as also when the crime is repeated, the punishment may be inflicted for a period not exceeding six years' imprisonment. Any one who makes use of weights or measures in the exercise of his trade which are not legally adjusted, or which, by time or use, have become deteriorated, shall for the first offence be liable to a penalty not exceeding 100 Rix-dollars, £11 2s. 3d., and in case of repetition to a higher penalty or imprisonment.

Paragraph 278.

Likewise, as stated in the first part of the foregoing paragraph, any one who adulterates goods (articles of food), or who fraudulently furnishes goods or other articles with a public stamp or mark with a view of making the same appear real and good, or who fraudulently procures such stamp or mark on articles which are not fit for it; also anyone who without right applies the stamp or mark of others upon articles which are of inferior quality to that which the stamp or mark would indicate, shall be punished. In case the articles upon which the stamp or mark of other persons is applied without their sanction are not of very inferior quality, the punishment stipulated in the second part of the preceding paragraph shall be applicable, and proceedings will only be taken against the offending party should the party who has been wronged request it.

The above law shall likewise be applicable with regard to minor adulterations which may be practised by retailers, and by which any one may suffer only a trifling loss.

Proceedings of Institutions.

Hunslet Mechanics' Institution.—The report for the last year, in reviewing the progress of the Institution, states that there is no cause for despondency. Since the date of the last report, the rules of the Institution have undergone a thorough revision, and are now reprinted; and the committee venture to assert that they consider them calculated to promote a more healthy condition than existed heretofore. The number of members on the 31st December, 1866, was 336, and they may be classed as follow:—82 paying at the rate of 10s. per annum, 119 at 8s. per annum, 101 at 6s. per annum, 34 at 4s. per annum. When compared with the number of members on the books on the 31st December, 1865, there is an increase of 12. The number of persons who have entered and re-entered during the year is 180, while 102 have withdrawn. The quarter commencing with October experienced a considerable addition to the numbers—73 having entered during that month alone. But this is sufficiently accounted for by the increased advantages offered to members wishing to join the evening classes, and partly, too, by the attractions supplied in the lectures and entertainments. Still, out of a population of upwards of thirty-three thousand, and chiefly composed of the working classes, the numbers ought to be far larger. The committee think they possess all the machinery necessary to render a Mechanics' Institution a successful one, lacking only one matter—the support of the artizans themselves. This is a cause of great regret. It must not, however, he forgotten that the generally prosperous state of trade in this district has made large demands on the labour of those who might otherwise be expected to flock to the Mechanics' Institution. The subscription of members amount to £94 17s. 5d., this sum being less than in 1865; the principal falling off occurring during the summer months, but partly also owing to many members being in arrears. As regards the educational department, the day schools and the whole of the classes are in full and satisfactory operation. The total number on the books is 275:—Day school—Boys, 39; girls, 36; preparatory, 88; total, 163. Evening classes—Male, 45; female, 55; drawing, 12; total, 112. These figures are not quite so high as the previous year. But the most cheering feature in this department is the remarkable success which has attended the male evening classes. The number in actual attendance in the October quarter was 71. At the close of the last Session for the evening classes, the committee held a written examination of those pupils who had been in attendance, and who thought proper to come forward. The result was the award, through the munificence of the President and a few gentlemen interested in evening class instruction, of thirteen prizes in books to the successful candidates. At the examinations of the Society of Arts, and of the West Riding Educational Board, to each of the successful candidates the committee awarded a prize. The number of competitors at the latter was considerably smaller than those of the previous year, and this is partly attributed to the fact that the Board discontinued the practice of offering prizes to pupils attending day-schools. When the evening classes closed for the summer months, the committee endeavoured to keep up the connection with their pupils by providing means for their recreation and amusement outside, but they failed in securing a field sufficiently central and in other respects eligible. The drawing class continues to do its work regularly, there being twelve in attendance. Prizes were awarded by the Science and Art Department to John Goldthorp, W. Harrison, Wesley North, and C. Swales; and R. J. Milligan, W. North, and C. Swales, having previously passed in three subjects, obtained their certificates. For the first time, too, thirteen of the students have had the privilege of sending their year's drawings to the Department; and Walter Best and C. C. Braithwaite obtained a prize each; while

G. Bedford, C. Swales, Jos. Lilley, Jos. Goldthorp, and John Goldthorp received honourable mention. In this branch the committee have awarded three additional prizes; and they cannot help expressing their conviction that the students in drawing require much more encouragement than they have hitherto received; and they feel persuaded that a few well-selected prizes offered by gentlemen in the neighbourhood could not fail to have a most beneficial effect. There are now about 2,900 volumes in the library, 87 of which have been added during the past year. The monthly circulation for the last quarter averaged about 550, while during the summer months it was not more than 310. A new catalogue has been prepared. Several lectures and entertainments were introduced during the year, and though the lectures have been of a superior character, the committee have still to regret that they were not better attended. At the annual *soirée*, presided over by the late Mayor (H. Oxley, Esq.), though on a Saturday evening, the attendance of the working classes was in no way better than on former occasions. In a pecuniary point of view the committee are thankful to have to report that the subscriptions to the *soirée* fund have exceeded all former ones, and they have been enabled to pay £50 towards the reduction of the debt on the building, as well as £20 for the year's interest, and £20 to the general fund, leaving a balance of £10 5s. 11d. for the purchase of new books, &c., for the library. The general account shows that the income has been £218 15s. 1½d.

EXAMINATION PAPERS, 1867.

The following are the Examination papers set in the various subjects at the Final Examination held in April last:—

(*Continued from page* 578.)

NAVIGATION AND NAUTICAL ASTRONOMY.

THREE HOURS ALLOWED.

Section I.

1. The arc of the great circle joining the poles of two great circles measures the inclination of the planes of the circles.

2. Define the polar or supplemental triangle of a spherical triangle, and prove that the sum of an angle of the primitive triangle and a side of the supplemental triangle is equal to two right-angles.

3 Express the tangent of half the side of a spherical triangle in terms of the angles of the triangle.

Section II.

1. When one side of a spherical triangle is a quadrant, obtain expressions connecting the other sides and angles.

2. Having given any two sides of a spherical triangle, and a triangle opposite to one of them, find the other two angles and the third side. Explain the ambiguity in this case.

3. Obtain an expression for the angular radius of the circle which passes through the angular points of a given spherical triangle, in terms of its angles or sides.

Section III.

1. Find the compass course and distance from A to B. Given—

	Lat.				
A	57° 18′	} N	Variation 2 pts. E.	Long. A 33° 27′	} S
B	38° 15′	}	Deviation 3° W.	B 33° 27′	}

2. May 18, at noon, a point of land in lat. 57° 33′ N. Long. 127° 16′ E. bore by compass S. ½ W. Variation, 1½ W., deviation, 9° 55′ E. (Ship's head E. by N.). Afterwards sailed by compass during the next 24 hours, as follows:—

K.	⅛th	Courses.	Wind.	Leeway.	Deviation.
83	5	S.S.E.	N.W.	½	0 56′ W.
55	8	S. ½ W.	S.E.	2	3° 40′ W.
74	6	NE. ½ E.	N. b. W.	1¾	10° 30′ E.

Required the latitude and longitude in on May 19, at noon.

Section IV.

1. July 1, 1867, the observed meridian altitude of α Eridani under the S. Pole was 21° 48′ 40″, the index error was + 1′ 10″, and the height of the eye was 20 ft. Required the latitude.

2. July 9, 1867 p.m., in longitude 148° 45′, the obs. mer. alt. of Moon's LL. was 46° 10′ 10″. (Zenith N. of moon.) Index error — 1′ 55″, and height of the eye 20 feet. Required the latitude.

3. May 26, 1867, p.m., in latitude 31° 31′ N., the obs. alt. of Antares (east of mer.) was 15° 49′ 45″; at the same time the chronometer showed 8h. 46′ 56″ (it being May 26, p.m., at Greenwich.) The index error was + 3′ 55″, and the height of the eye was 17 feet. Required the longitude.

On May 2, at Greenwich, noon, the chronometer was too slow at G.M.T. 1′ 8″, and its daily rate was 7·6″ losing.

Section V.

1. Define course, and show that—

$$\text{Tan. course} = \frac{\text{Diff. long.}}{\text{Mer. diff. lat.}}$$

2. Write down and prove the formulæ employed in middle latitude sailing.

3. Obtain expressions for finding the latitude and longitude of the vertex in great-circle sailing.

Section VI.

1. If P be the pole of the heavens, Z the zenith, and S the place of a heavenly body in the celestial sphere, what are the sides and angles of the triangle P Z S?

2. Prove the rule for finding the latitude by equal altitudes of the sun observed before and after passing the meridian.

3. Show that the error in time corresponding to a small error in the observed altitude is the least when the heavenly body is on the prime vertical.

Section VII.

1. April 3rd, 1867, at 7h. 10m. a.m., in lat. 50° N., long. 170° W., the sun bore by compass S. 78° 45′ (ship's head N.E. b. E., dev. 10° 55′ E.) when the observed alt. sun's L.L. was 15° 13′ 20″, the index error was—1′ 55″, and the height of the eye was 12 feet. Required the variation.

2. May 14th, 1867, at 9h. 45m. p.m., in lat. 51° 10′ N., and long. 0° 15′ W., the following observations were made:—

	Obs. alt. Regulus.	Obs. alt. Moon's L.L.	Obs. dist. N.L.
	39° 16′ 50″	34° 55′ 50″	43° 39′ 30″
Index error	— 1′ 35″	— 1′ 40″	— 1′ 10″

The height of the eye was 25 feet. Required the longitude.

Section VIII.

Describe the errors to which the sextant is liable. Show how the index error is found.

PRINCIPLES OF MECHANICS.

THREE HOURS ALLOWED.

1. What is the difference between the investigation of Statics, Dynamics, and Cinematics? Illustrate your remarks by simple examples.

2. State the principal laws of motion. What facts render their truth probable?

3. State and prove the parallelogram of velocities. Is this proposition a mechanical or geometrical one?

Example.—Velocities of 5 and 7 are simultaneously given to a small body, in directions making a known angle: investigate an expression for the actual velocity. Find the results when the angle is 30°, 60°, or 90°. What must the angle be when the velocity is 6?

4. What principle do we assume to determine questions on impulsive action between bodies? What action takes place between elastic bodies during impact, as distinguished from inelastic bodies?

Example.—A body weighing 12 lbs., moving with a speed of 200 yards per minute, overtakes a body weighing 30 lbs., moving with a speed of 50 yards per minute. What is the common speed after impact, if the bodies be inelastic? What are their respective motions if each be perfectly elastic?

5. State the difference between a simple and compound pendulum; and explain the terms "centres of oscillation and suspension."

Example.—What is the distance of these points in a body which oscillates in $2\frac{1}{2}$ seconds?

Example.—A clock gains 3 seconds a day when removed to the bottom of a shaft. Find the decrease in the force of gravity.

6. Investigate the formula for the space described by a body thrown vertically upward or downward, and acted upon by gravity.

Example.—A stone is dropped into a well, and the splash is heard 5 seconds afterwards. Sound travels 1,100 feet per second. What is the depth of the well?

7. How many systems of pulleys are usually found to be employed? What allowances are practically made for the size and rigidity of the ropes?

Example.—A wheel and axle weigh 3 cwt.; the radius of the wheel is 3 feet, and that of the axle 8 inches; the radius of the axis is $1\frac{1}{2}$ inches; the latter is of wrought iron, and rests upon a bearing of cast-iron (coefficient of friction = ·075.) Find what power will just support or just raise a ton.

If friction be neglected, what is the power required?

8. Define the term "centre of gravity." Show how to find it in some regular bodies; also in a system of heavy particles, connected by rods whose weight is neglected.

Example.—Out of a round boiler plate, 3 feet in diameter, is cut a circular hole, 1 foot in diameter, which just touches the rim of the plate. How far is the centre of gravity of the rest of the plate from the centre of the rim?

If a piece of brass were to replace the iron that has been removed, where would the centre of gravity of the whole be?

N.B.—The comparative weights of brass and iron are as 14 to 13.

9. A body moves about a fixed horizontal axis. Investigate the time in which it oscillates.

Example.—A trap-door, 6 feet long and 4 feet broad, is made to swing slightly about a horizontal axis. Find the time of its doing so.

10.—Show that fluids press equally in all directions. Hence prove that a floating body displaces as much fluid as is equal to its own weight.

Example.—A diamond ring weighs 70 grains; but when weighed in water 65 grains; the comparative weights of a diamond, of gold, and of water, are as 7, 33, 2. Find the weight of the diamond in the ring.

11. Show how to make and graduate a common thermometer. What scales are commonly used? Express 100° Fahrenheit in each of these scales.

12. "The elastic force of air at a given temperature varies as the density." How has this statement been experimentally proved?

13. Describe one or more varieties of the barometer.

A bad barometer is twice compared with a good one. Its readings are 59·85, 30·16, when they ought to be 30·61, 31. What is the true reading when it appears to be 30·56?

14. A heavy fluid is contained in a vessel, which is made to revolve round a vertical axis. Show that its surface assumes the form of a paraboloid.

15. How is the work of steam computed in a high-pressure engine?

PRACTICAL MECHANICS.

THREE HOURS ALLOWED.

1. Explain what is meant by the *pitch circle* of a toothed wheel. Upon what principle are bevil wheels constructed?

2. Show how the crank and connecting rod are employed in an ordinary locomotive to communicate motion from the piston of the engine to the driving wheel. If the lengths of the crank and connecting rod be respectively 10 inches and 5 feet, what is the distance of the piston from the middle of its stroke when the crank has moved half-way between the dead points?

3. Describe the reversing motion of three pulleys and three bevil wheels, as commonly adopted in planing machinery.

4. What is meant by aggregate motion in machinery? Explain the differential screw. A toothed wheel gears with two parallel racks, whereof one is fixed and the other moveable; if the centre of the wheel be moved through a given space, how far will the moveable rack be shifted.

5. Describe the general arrangement of the wheel work in an eight-day clock. How is motion given to the hour hand? What is the principle of the escapement?

6. Show how change wheels may be employed to alter the relative angular velocities of two parallel axes. What use is made of change wheels in the screw cutting lathe?

7. Point out the use of conical pulleys in changing continuously the relative angular velocity of two parallel axes. If the axes were perpendicular and intersecting, instead of being parallel, what contrivance would you employ to effect a like variation?

8. Explain the working of an atmospheric steam-engine; point out its defects, and describe generally the single-acting condensing engine invented by Watt.

9. Describe the manner in which the steam acts in a locomotive engine, sketching the slide-valve and steam passages.

10. What is the principle of the parallel motion of a beam-engine.

11. Draw the indicator diagrams which you would expect to obtain from a double-acting condensing engine, and also from a high-pressure engine. How would these diagrams assist you in ascertaining the working horse power of each engine?

12. Describe generally some form of direct-acting engine for driving a screw-propeller.

(To be continued.)

PARIS EXHIBITION.

A new and interesting contribution to the Exhibition has just arrived from Siam; the King of that country has sent nine highly-ornamented pirogues, as specimens of the most perfect maritime construction produced in his dominions. The boats are very graceful in form, and attract much attention.

Amongst the many complaints made against the awards of the juries, that of the watchmakers of Besançon attracts perhaps most attention. While Paris, London, and Geneva receive gold medals, Besançon is only awarded silver ones. The people of Besançon claim to have nearly driven all other makers out of the French markets, the imports of watches having fallen from 200,000, in 1845, to 71,000 in 1866; and say that out of 382,000 watches entering into the trade of France last year, 305,000 were made at Besançon and in the mountains of the Doubs, where 30,000 men are engaged in the trade; the value of the products being about £800,000. The Besançon watchmakers, however, speak only of quantity and not quality; and it is well known that the action of the jury in the case of the English watchmakers was most severe. To meet such demands as that of Besançon, and, indeed, to justify certain awards that have been made, two kinds of awards seem to be required, one for excellence of workmanship, the other for commercial ability. An increase in the number of useful cheap articles is a benefit to the community, but a million of common watches could not be equal in the eyes of the jury to one first-rate chronometer. The whole system

of recompenses is surrounded with difficulties, and the short period allowed for the action of the juries on this occasion no doubt complicated the case; it was simply impossible to do the work well in the time given. The appointment of a special commission to revise the list of awards is, to a certain extent, a proof of the validity of the complaints made.

The Imperial Commission has again reduced the price of the season tickets, which are now charged 40 francs for ladies as well as gentlemen. There is little doubt that the original price of 100 francs was too high, and it would appear that the late charge of 60 francs has not been found to answer; but at any rate, the principle of diminishing the price as the season advances seems fair, and is likely to be successful. The number of visitors to the Exhibition has fallen off greatly during the last few weeks, but this is not surprising; the provincials cannot leave their homes at present, there is a lull after the excitement of the awards; and, lastly, the weather has been exceedingly unfavourable. There is no doubt that August and September will bring crowds to the Champ de Mars. Those who come soon will be likely to find more room than those who put off their visits.

A meeting of Foreign Commissioners to the Exhibition took place the other day at the Club-house in the park, when the Comte d'Avila, representing Portugal, was called upon to preside, and it was proposed that an address should be presented to the Emperor, for the reception which the Commissioners had met with from the Imperial Government and Commission; the proposition was carried by acclamation.

A society has been formed, under the auspices of the Imperial Commission, for the encouragement of fisheries, and maritime and fluvial agriculture, by means of publications, periodic exhibitions, by the loan of instruments to fishermen and others, and by the organization of associations for watching over fisheries, preventing poaching, and supplying rivers with fish; a committee of organization, consisting of MM. Gassier, Lacoin, Pujol, and Roger Desgenette, has been appointed with full powers.

Manufactures.

Boiler Explosions.—The engineer's report of the Midland Steam Boiler Inspection and Assurance Company, presented at the tenth half-yearly meeting, and dated 27th February last, says that, up to December 31st, 1866, there were 890 boilers under inspection and 1,300 under assurance, making a total of 2,190 boilers under the care of the company; and that there has been no explosion of any boiler under the care of the company during the past half-year, nor indeed during the whole of the past year, excepting one of a very trivial character. During the five years the company has been in operation, there has been only one serious claim upon the guarantee fund for an assured boiler, and even that would have been prevented if the warning given of the danger had been attended to. Two other serious casualties have happened to boilers under inspection in the five years, one before opportunity of internal examination had been given, and the other after the danger had been reported. During the past year there have been made 11,523 inspections of boilers, and of these 1,380 have been inside and 1,367 in the flues. During the year, 1,168 reports have been sent to owners, pointing out matters needing attention. By far the most frequent cause of injury to boilers has been found to be corrosion, especially externally, where the plates have come in contact with the brickwork; needless danger is also often caused by the over-weighting of the safety-valves. Very great mischief is allowed to be done by want of timely repair, or by the straining of repair hastily executed. Records have been obtained of 70 boiler explosions, during the year 1866, in Great Britain, causing the death of 85 and the injury of 160 other persons. This cannot be considered the total number, as some may have attracted so little attention as not to be heard of beyond their immediate neighbourhood. The class of boiler which has most frequently exploded, and has caused the most loss of life, is the Cornish or two-flued boiler, internally fired, and the records show that this otherwise safe and economical boiler requires attention to certain well-established details of construction, especially in the strengthening of tubes of large diameter with rings; and also that the shell is liable to corrode, and that corrosion is as dangerous to this as to any other class of boiler. The greatest number of explosions have happened to boilers employed in iron-works and collieries, or mines, and this is hardly to be wondered at, as the number of boilers so employed must far exceed those used for any other purpose; and, as steam was early introduced into these industries, many of the boilers have been used longer than at any other work. The causes which have led to the greatest number of the explosions have been the faulty construction before alluded to and corrosion. In nearly every case the cause was readily to be discovered, and the evil could have been avoided or remedied had the boilers been subjected to proper periodical inspection. The 2,190 boilers under the care of the company are used for the following purposes:—917 in collieries, 1,096 in iron-works, and 177 in other works or mills. They are of the following general description, 1,853 fired externally, and 337 fired internally. The chief points noticed in inspection of the boilers during the past year, and mentioned in the reports to owners, may be classed under the two general heads of those relating to the construction, form, setting, material and workmanship, and others relating to the fittings or working of the boilers. Under the former head, attention has been called to the need of strengthening rings for the large internal tubes, so often the cause of explosion. The weakness of flat ends has several times been detected. Dangerous weakness has often been noticed from large manholes without strengthening rings, and these very frequently further weakened by corrosion, or by the strain of the clamps too tightly screwed to prevent the leaking of badly-made joints. It has been necessary to have some domes strengthened with stays, to compensate for the large holes of 3, 4, or 5 feet diameter, cut out of the shell, although it would have been easier to have left it in with a small hole in the centre for the passage of the steam. Several forms of boiler have been pointed out as needlessly complicated where only a slight advantage has been gained at the sacrifice of durability and facility of cleaning. Many seam-rips have been discovered in boilers made of extreme length for burning the gases from blast furnaces, and it has been recommended that the evil should be avoided by having two or more shorter boilers set in the same straight flue. Extreme difficulty has been met with in flue examinations from the utter disregard of provision for cleaning out or passing along the flues. Many boilers of small diameter are set at great expense, with narrow inaccessible wheel flues, where a plain flash flue would have been better. The external flues of Cornish boilers have been found particularly narrow, and, being rounded to match the shell of the boiler, are most difficult and dangerous to traverse, and yet no part of the boiler requires more careful examination to detect corrosion than where the plates touch the brickwork. Several boilers have been noticed with iron of such bad quality as to crack in the body of the plate and through the rivet holes after working only a few months; and rivetting has been detected where the rivet iron has been so bad, and the workmanship so careless, that the heads could be broken off with the blow of a light hammer. Nothing could be greater folly than to attempt to work boilers of such material and workmanship. Perhaps nothing causes greater annoyance to boiler owners than the difficulty of

getting repairs properly executed, as boilers are frequently permanently injured by repairing with heavier plates than needed, and straining the old plates up to them; and also by carelessly altering the position of seams, so as to destroy the crossing of joints. With regard to the points relating to the working of the boilers, it has been necessary to urge the imprudence of using boilers of great age, as in some that have worked for upwards of thirty years the plates and rivets have been found so much deteriorated as to make it impossible to calculate what pressure they would bear, rendering them very uncertain and dangerous. The needlessly heavy fires under many boilers have been noticed, where the fuel was piled up to within a few inches of the boiler, allowing no room for proper combustion, and greatly injuring the plates by over-heating a small area over the fire, instead of allowing the flame to circulate as far as possible beyond the bridge. This evil is generally associated with another, quite as injurious, and that is regulating the fire by opening the fire door instead of by using the damper, so that the already over-heated plates are exposed to the contracting influences of a stream of cold air. The most frequent evil pointed out is external corrosion from the leaking of fittings bolted instead of rivetted, or from rain allowed to penetrate beneath the brickwork, and yet corrosion could be most easily avoided by proper vigilance. Safety valves are repeatedly found over-loaded to prevent leaking, when the faces require grinding, and sometimes temporarily repaired with sheet lead inserted between the faces. An over-weighted safety valve is a wilful courting of danger. Many fusible plugs have been noticed as defective, consequently leading to a false feeling of security. Self-feeding apparatus has been found deranged, so that too much confidence should not be placed in it. Many boilers have been found without pressure guages or with the guages incorrect or badly placed. The general condition, however, of the boilers under the company has improved.

Colonies.

Cultivation of Beet in New South Wales.—The cultivation for the sake of the spirit and sugar of beet-root is attracting attention in this colony. A patent for the manufacture of spirits from beet-root has been taken out there. It is said that by the last mail steamer the patentees received from France a package of 200lbs. of the seed of the genuine sugar beet.

Queensland Shipping Statistics.—It appears that during the year 1866, whilst 569 vessels, of 197,665 tons, were entered inwards at the various ports of the colony, 556 vessels, of 195,991 tons, were cleared outwards. The following table shows the nationality of the vessels with which the trade of the colony is chiefly carried on:—

	Inward vessels.		Outward vessels.
Great Britain.....	37	..	9
Germany	5	..	—
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South America	—	..	12
Java.....	12	..	18

Publications Issued.

Inventors and Inventions. By Henry Dircks, C.E. (*E. and F. N. Spon.*) This work is divided into three parts. The first takes up the philosophy of invention, considered strictly in relation to ingenious contrivances tending to facilitate scientific operations, to extend manufacturing skill, or to originate new sources of industry. The second treats of the rights and wrongs of inventors, particularly as affected by the influence of patent monopoly, legally and politically examined. And the third gives an account of the early inventors' inventories of secret inventions, employed from the 13th to the 17th century in substitution of Letters Patent.

Notes.

Water Supply.—The following letter, addressed to the *Lancet*, gives some interesting particulars relative to the purity of water for domestic purposes:—"We have recently made an examination of the Loch Katrine water as supplied to Glasgow. The water was taken from one of the mains in Glasgow. The result of the examination is calculated to surprise many persons, for the Loch Katrine water has often been cited as a model water. We find that 1,000,000 parts of this water contain putrescible organic matter corresponding to 0·13 parts of ammonia. The numbers for the New River water, which supplies some parts of London, are 0·09, and for the Southwark and Vauxhall Company's water, taken from the Thames, high up the river, 0·20. The Caterham water, and also a spring in the greensand, near Dorking, contain no putrescible organic matter. These facts point to the propriety of seeking for a supply of drinking-water from springs, and not from rivers and lakes. We are, &c., J. Alfred Wanklyn, Ernest T. Chapman, Miles H. Smith. London Institution, Finsbury-circus, July 1st, 1867."

Museum of the Archives of France.—The Museum of the Archives of the Empire was opened recently, and, with the fine old historic mansion in which it is contained, will make another addition to the curiosities of Paris. The rooms in which the museum is placed were formerly the apartments of the Dukes of Soubise, and the walls are decorated with forty pictures by the best painters of the eighteenth century. Amongst the contents of the museum itself is the series of Chancery registers, from the sixteenth century to the present time.

Crop of Beetroot for Sugar.—Speaking of the great uncertainty attached to the cultivation of beetroot, the *Journal des Fabricants de Sucre* of the 25th July states that, notwithstanding the fact that the heavy rains and great cold at the commencement of the season had injured the prospects of the crop, it has now been saved by the same unseasonable rains and cold at a later period. The plants are being slowly but surely developed, and are thus in a good condition to encounter the great heat which may be expected, and which, if it come, will find the soil, the leaves, and the root admirably prepared to encounter it. Only a month ago a crop could hardly be looked for, such was the backward state and miserable appearance of the plants; but the beetroot is now growing luxuriantly and vigorously, and a favourable result may be expected, although a large portion of the crop is still backward, and will not be able to offer much resistance to any very great heat or prolonged drought. The fears of a large deficit entertained at the commencement of the season may now be dismissed, and, at least, an average crop may be looked for. As to the saccharine richness of the plant, which is so important an element for the manufacturer, as upon it depends a very large portion of the quantity of sugar produced, nothing can as yet be said, and six weeks or two months will have passed before a fair opinion can be given.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 17th July, 1867.

Par. Numb.

238. Bill—Customs Revenue.
239. ,, Inland Revenue.
253. ,, Customs Duties (Isle of Man).
254. ,, Court of Appeal, Chancery (Despatch of Business).
255. ,, War Department Stores.

256. Bill—Consecration and Ordination Fees.
257. ,, Dundee Provisional Orders Confirmation.
440. Salmon Fisheries (England and Wales)—Sixth Annual Report.

Delivered on 18th July, 1867.

252. Bill—Railway and Joint Stock Companies' Accounts (amended).
258. ,, Hours of Labour Regulation (amended by the Select Committee).
259. ,, Investment of Trust Funds (amended).
187. Import and Export Duties (Foreign Countries)—Return.
426. Game Laws (Scotland) Bill—Minutes of Proceedings.
431. (A) Poor Rates and Pauperism—Return (A) (April, 1866 and 1867.

Delivered on 19th July, 1867.

357. Harbours of Refuge—Quarterly Reports.
Colonial Possessions—Reports (Part II.): North American Colonies; African Settlements and St. Helena; Australian Colonies and New Zealand; Eastern Colonies; The Mediterranean Possessions.

Delivered on 20th July, 1867.

246. Bill—Dublin Metropolitan Police.
260. ,, Sewage.
264. ,, Wexford Grand Jury.
265. ,, Morro Velho Marriages.
434. Foreign Cattle—Returns.
437. Westminster Abbey—Scheme.
438. Temporary Laws—Register.
439. Public Income and Expenditure (30th June, 1867)—Account.

Delivered on 22nd July, 1867.

251. Bill—Public Health (Scotland).
266. ,, Trusts (Scotland).
267. ,, Church Temporalities Orders (Ireland) Validation, &c.
335. (1) East India (Bengal and Orissa Famine)—Return, Part II.
448. Friendly Societies (Scotland)—Report.
452. Army Estimates—Revised Supplementary Estimate.

Delivered on 23rd July, 1867.

262. Bill—Public Works (Ireland).
Public Petitions—Thirty-fourth Report.

Patents.

From Commissioners of Patents' Journal, July 26th.

Grants of Provisional Protection.

Axles—2036—K. J. Winslow.
Bale fasteners—1972—H. C. Carver.
Balustrades, &c.—1364—H. R. Cottam.
Bedsteads—1362—H. R. Cottam.
Blind pulleys—1800—F. G. N. Perrett.
Boilers—1637—C. L. J. Carville.
Bones, &c., crushing—2010—E. and F. Crook.
Boots and shoes—2064—H. Bell.
Bricks, &c.—2028—G. R. B. Amott.
Bridges, suspension—2018—J. E. Whiting.
Buckle, self-acting, for hoisting, &c.—2025—W. Heyes and W. Bevan.
Cables, submarine, protection of—1856—M. F. Maury.
Carpets and rugs—2014—W. Wood.
Carriage trimmings, &c., coating—1630—A. Albright.
Carriages, &c., bearings for—2037—B. Hunt.
Cartridge cases—1835—E. Leahy.
Chimney tops—1990—J. Capper.
Compasses—2059—P. M. A. Laurent.
Corsets—2056—G. T. Bousfield.
Cotton, &c., preparing—2076—J. M. Hetherington and R. W. Pitfield.
Doors and windows—2041—R. A. Kennedy.
Doors, indicating names, &c., on—2062—W. Drury and C. Westrup.
Engines—2000—M. P. W. Boulton.
Fabric, elastic woven—1998—A. Turner and W. Hemsley.
Finger stall for writing with one finger—1969—P. L. F. E. Roussel.
Fire-arms, breech-loading—2040—E. Hohenbruck.
Fire-bars—2042—J. Nelson.
Fires, compound for igniting—2055—A. E. Herrmann.
Furnaces—1986—J. C. Major.
Furnaces—2048—J. Kellett.
Furnaces—2050—C. T. Higginbotham.
Furnaces, boilers, &c.—2049—G. Sinclair.
Gas stoves—1653—T. H. Saunders.
Grain, &c., drying—2023—J. N. Patman and H. M. Davey.
Hay-making machines—2002—W. Andrews.
Hoisting apparatus—1965—M. Henry.
Horse rakes—2060—R. Sims and J. Prest.
Knife cleaning machines—2094—G. Weedon.
Laces, metallic eye for—2024—G. Davies.
Lamps—2082—F. B. Vallance.
Lamps, safety—1938—D. P. Morison.
Lanterns, lighthouse—2054—D. M. Henderson.
Life boats—2052—A. M. Clark.
Life buoys—2019—J. S. Hood.
Looking-glass and picture frames—1789—M. Lyons.
Looms—2020—D. and J. Collinge.
Looms—2053—E. B. Bigelow.
Meat, &c., apparatus for mincing—2051—J. H. Johnson.
Metallic cases, cylindrical—2033—J. S. Henderson and J. Macintosh.
Moist substances, washing and drying, &c.—1930—G. Gordon.
Oils, treatment of—2100—J. H. Johnson.
Ores, &c., crushing and pulverizing—2092—T. Archer.
Paper, &c., preparing, with a solution of perchloride of iron—2006—G. Gabillon.
Plug valves—1992—I. M. McGeorge and A. Paul.
Pumps—2022—F. Holmes.
Railway carriages—2061—J. Walker.
Railway crossings—2026—W. L. Wise.
Railways—2038—W. E. Newton.
Railways, communication between guard and passengers on—2080—J. T. Skinner.
Reeds and healds used in weaving—2068—J. C. Ramsden.
Refrigerators—1988—G. Severn.
Refrigerators—2031—J. Stirk and H. Bycroft.
Rocks, &c., boring—2027—W. E. Newton.
Ruling apparatus—2070—J. G. Tongue.
Saw machines, circular—2030—A. H. Brandon.
Ships' sails, reefing, &c.—2066—H. Duke.
Smoke-consuming apparatus—2043—J. B. E. G. Perrin.
Spindles of spinning, &c., machines—2096—A. de Smet.
Steel, &c., manufacturing—2046—J. Hargreaves.
Stoppers for bottles, &c.—2021—H. B. Fox and J. T. Hall.
Sugar, manufacturing refined—2034—J. H. Johnson.
Tape winders—1872—J. and J. Cash.
Telegraphs—2016—W. S. Andrews.
Thrashing machines—1996—W. Tasker.
Valves, safety—2053—J. Pasfield.
Vent-pegs—2067—E. T. Hughes.
Washing-basins, &c.—2072—I. Baggs.
Watches and chronometers, manufacturing—2032—J. B. Fraiser.
Wood, machinery for tenoning—2047—W. B. Haigh.
Wood to iron, fastening—2057—J. Laing.
Wood-planing machines—2029—A. H. Brandon.
Works, &c., construction of sub-aqueous—2039—J. S. Burke and B. Burleigh.

Inventions with Complete Specifications Filed.

Boiler tubes, cleaning—2134—W. R. Lake.
Spinning machines—2117—G. T. Bousfield.

Patents Sealed.

223. J. Poole.
227. W. H. Stallard.
239. W. W. Pocock.
251. P. Ellis.
258. J. F. D. Donnelly.
269. E. T. Hughes.
277. G. Russell.
299. R. D. Napier.
300. D. Greig, R. Burton, and F. Parker.
335. W. Rigg.
348. E. Siddaway.
410. J. Thompson.
672. L. Tidén.
711. W. Trimble.
1162. H. Fassmann.
1438. J. Johnson.

From Commissioners of Patents' Journal, July 30th.

Patents Sealed.

261. C. W. Siemens.
263. E. J. Padbury.
264. C. E. Brooman.
275. J. A. Murray.
276. W. and D. Fisken.
278. I. Baggs.
280. S. H. Foster.
286. N. T. Folsom.
287. F. Bauman.
293. J. Smith and G. Wilson.
296. E. S. Crease.
298. J. G. Tongue.
302. C. P. S. Wardwell.
314. J. J. Harrison.
317. P. M. Parsons.
320. T. Craven.
334. S. Alley.
337. J. Graham.
338. A. B. Brown.
340. F. Rosenauer.
353. W. Conisbee.
359. A. Ormsby.
376. R. James.
383. G. H. Kidd.
530. A. V. Newton.
684. H. A. Bonneville.
911. D. Foster and R. Cooke.
1051. W. Clark.

Patents on which the Stamp Duty of £50 has been Paid.

1882. J. Livesey and J. Edwards.
1842. D. Barker.
1853. G. Lansdown.
2041. B. B. Stoney.
2922. J. Paley & T. Rawsthorne.
1864. W. Irwin.
1904. F. E. B. Beaumont.
1930. P. G. B. Westmacott.

Patents on which the Stamp Duty of £100 has been Paid.

1803. J. Pilkington.
1810. T. and D. G. Fowler.
1811. L. Kaberry.
1837. J. Hamilton.

Registered Designs.

4867—July 2nd—Ladies' under garment, called a chemise—Mrs. Hornblow, 12, St. Ann's-square, Manchester.
4868—July 2nd—Tooks' reversible school desk—F. G. Tooks, Herston, near Swanage, Dorsetshire.
4869—July 4th—Sash fastener—Clark and Hunt, 159, Shoreditch, E.C.
4870—July 4th—An adze—Rabour, Brothers, and Co., Birmingham.
4871—July 15th—An improved bridler for painters' brushes—Finneby and Son, Cannon-street, City, E.C.
4872—July 17th—The centre wheel plough—W. Chamberlain, Dodbrook, South Devon.
4873—July 19th—The self-adjusting trousers—C. Roe, 27, Old Bond-street, W.
4874—July 27th—A stand or holder for drinking glasses—Farrow and Jackson, 18, Great Tower-street, E.C.

Journal of the Society of Arts.

FRIDAY, AUGUST 9, 1867.

Announcements by the Council.

Society's Visit to the Paris Exhibition.

The visit of the members to the Universal Exhibition, 1867, is now taking place, as follows :—

The visit will extend from Monday, the 29th of July, to Friday, the 16th of August.

A Reception Room has been provided for the use of the members at No. 43, Rue Saint Georges, where members can have their letters addressed, where they can write their letters, make appointments and arrangements, and where notices of any special matters connected with the visit will be suspended. Members are requested to register their names and addresses here on their arrival in Paris. Lists of Hotels will be provided.

Arrangements have been made by which the Members of the Society of Arts will, through the kindness of the proprietors, be admitted, on the presentation of their cards of membership, to inspect Imperial and Municipal establishments, factories, and workshops in the following list :—

His Excellency the Minister of Public Instruction has most kindly arranged for the Members visiting the Lycées of Paris, and has also further favoured the Society with tickets to view the exhibition of the works of the pupils in the Communal schools, and of the collections made by the Scientific Commission of Mexico.

The Director of the Imperial Mint (La Monnaie) has given instructions that members of the Society, when provided with their cards, which will be prepared for the purpose, shall be admitted to that establishment on Tuesdays and Fridays, from twelve to three o'clock.

The Director of the Imperial Observatory has arranged that the Members presenting their cards of membership at that establishment shall be admitted on Saturdays, between half-past two and four o'clock.

Monsieur le Senateur Hausmann, Prefect of the Seine, has politely promised to make proper arrangements for the visits of the members to the catacombs, sewers, and municipal establishments.

Through the kindness of M. Belgrand, the water engineer to the City of Paris, permission has been obtained for members to visit the Waterworks of the City of Paris at Menilmontant.

The Director of the Public Ways and Promenades of the City of Paris has thrown open the horticultural and other municipal establishments in his department, and has most obligingly tendered his assistance to the members.

M. Le Play, Commissaire-General of the Universal Exhibition, has very kindly expressed his desire to aid the members in any way in his power.

The following gentlemen and companies have politely opened their establishments to the Society :—

MM. J. F. Cail and Cie., engineers, Quai de Billy, No. 48, and Grenelle. Any day of the week, from 6 to 11 a.m., and from 12 to 5.

M. F. Barbedienne has furnished tickets of admission to visit his bronze foundry and workshops, 63, Rue de Lancry, on any day in the week, from 6 a.m. to 5 p.m.

MM. Barbezat and Cie., foundries, 58, Boulevard Prince Eugene, and 95 and 97, Rue Richard-Lenoir. Open to the members without restriction as to the day or hour.

MM. Ch. Christofle and Cie., gold and silversmiths, 56, Rue de Bondy, will receive a party of the members on any day appointed by the Society, between 12 and 2 o'clock.

MM. Hachette and Cie.'s great publishing establishment will be open to members on any day, between half-past 8 and 11 o'clock, by presenting their cards to M. Fouret, a member of the firm.

M. Ch. Lahure, Imprimerie Générale, 9, Rue de Fleurus, on any day and at any hour, except between 12 and 2 o'clock.

MM. A. Chaix and Cie., printing establishment, 20, Rue Bergère, on Friday in each week.

MM. Mazaroz-Ribaillier and Cie., furniture manufacturers, Exhibition rooms, 20, Boulevard des Filles de Calvaire ; manufactory, 4 and 6, Rue Ternaux Popincourt, freely open to the members.

MM. Thiboumery et Cie., Chemical Works, 190, Rue Croix-Nivert.

M. A. Piver, manufacturer of perfumery, 91, Rue de Flandre.

The Directors of the Compagnie du Chemin de Fer de Paris à Orleans have given leave for the members to visit their new passenger station and goods station, on presenting their cards of membership to M. Renault, Chief Architect of the Company, No. 1, Boulevard de l'Hôpital ; or to M. Prevel, 42, Quai de la Gare ; according as they desire to see the passenger station or the goods station.

The workmen's houses designed by H.I.M. the Emperor Napoleon III., and now in course of construction in concrete by Messrs. W. E. Newton (member of the Society) and E. C. Shepard, in the Avenue Daumesnil, near the Parc de Vincennes, may be inspected any day from 6 a.m. till 6 p.m. Mr. E. Newton, the resident engineer, is usually at the works from 10 till 4, but in his absence the foreman, M. Bourgignon, or his deputy, will afford members any information they may require.

Cards of membership, enabling members to take advantage of these arrangements, may be obtained on application to the Society's House, John-street, Adelphi, or at 43, Rue Saint Georges, Paris.

P. Le Neve Foster, *Secretary.*

The following list of hotels will be found useful :—

In the neighbourhood of the Tuileries.

Hôtel Meurice, 228, Rue de Rivoli.
„ Windsor, 226, „
„ Brighton, 218, „
„ Wagram, 208, „
„ Rivoli, 202, „
„ du Louvre, 166, „

On or near the principal Boulevards.

Grand Hôtel, 12, Boulevard des Capucines.
Grand Hôtel des Capucines, 37, Boulevard des Capucines.
Hôtel Scribe, 1, Rue Scribe.
„ de Bade, 32, Boulevard des Italiens.
„ du Tibre, 8, Rue du Helder.
„ du Helder, 9, Rue du Helder, Boulevard des Italiens.
„ Brezil, 16, Rue du Helder.
„ de Lancastre, 22, „
„ de l'Amirauté, Rue Neuve Saint Augustin.
„ Choiseul, 7, Rue de Choiseul.
„ des Deux Mondes, 8, Rue d'Antin.
„ des Etats Unis, 16, Rue d'Antin.
„ de la Grande Bretagne, 14, Rue Caumartin.

Rue St. Honoré, &c.

Hôtel de Lille et d'Albion, 223, Rue St. Honoré.
„ St. James, 211, Rue St. Honoré.
„ Choiseul, 241, Rue St. Honoré.
„ du Danube, 11, Rue Richepance.
„ Richepance, 14, Rue Richepance, near the Madeleine.
„ de l'Amirauté, 20, Rue Duphot.

Rue de la Paix, Place Vendôme, &c.

Hôtel de la Paix, 32, Rue de la Paix.
„ Westminster, 11, Rue de la Paix.
„ Mirabeau, 8, „
„ Bristol, 5, Place Vendôme.
„ du Rhin, 4, Place Vendôme.
„ Castiglione, 12, Rue Castiglione.

Palais Royal and Bourse.

Hôtel des Etrangers, 3, Rue Vivienne.
Grand Hôtel de France et d'Angleterre, 72, Rue Richelieu.
Hôtel d'Angleterre, 56, Rue Montmartre.
„ Bergère, 32, Rue Bergère.
Grand Hôtel de la Marine, 3, Rue des Vieux Augustins.
Grand Hôtel d'Albion, 20, Rue Bouloi.
Hôtel Bouloi, 5, Rue Bouloi.
Grand Hôtel de la Bourse, 15, Rue Nôtre Dame des Victoires.

Neighbourhood of the Northern Railway.

Hôtel de Chemin de fer du Nord, opposite the Railway Station.
Grand Hôtel du Nord, 45, Rue Lafayette.
Grand Hôtel de Strasbourg, 78, Boulevard de Strasbourg.
Hôtel Violet, Passage Violet, Faubourg Poissonnière.

Between the Western Railway Station and the Madeleine.

Hôtel des Etrangers, 24, Rue Tronchet.
„ Tronchet, 22, „
„ Folkestone, 9, Rue Castellane.
„ Bedford, 17, Rue de l'Arcade.
„ de l'Arcade, 43, Rue de l'Arcade.
„ Navarin, Rue Navarin.

South Side of the Seine.

Hôtel d'Amsterdam, 59, Rue Saint André des Arts.
„ des Beaux Arts, 1, Rue Beaux Arts.
„ Bretagne, 20, Rue de Seine.
„ „ 46, St. André des Arts.
„ de Breteuil, 1, Rue Dauphin.
„ Clovis, 69, Rue Monsieur le Prince.
„ Suffren, Avenue Suffren, Champ de Mars.

Railways and Steamboats.—The terminus of the Auteuil and Exhibition Railway is at the Western Station, Place du Havre. 2nd class carriages only 50c., intermediate stations 40c. Trains leave the terminus at 27 minutes, and the Exhibition at 25 minutes past each hour; there is an extra up train at 5·57. The Circular Railway (Chemin de Fer de Ceinture) has stations all round Paris, and joins the preceding at Auteuil. The large omnibuses of the American Railway run from the Bourse, and carry passengers for the Exhibition to the Pont d'Alma. Steamboats run from the Place de la Concorde every quarter of an hour for the Exhibition. Landing stage on the Paris side of the Pont de Jena. Other steamboats ply between the Champ de Mars and the Ile de Billancourt. Landing stage on the lower side of same bridge.

Numbers of Houses in Streets.—Even Nos. on right side, odd Nos. on left side of street, progressing in direction of the stream of the river, or commencing from the river in transverse streets.

Poste Restante.—Letters addressed "Poste Restante" to be applied for at the head post-office, 9, Rue Jean-Jacques Rousseau; but members can have their letters addressed to No. 43, Rue St. Georges.

Cab Fares in Paris.—Two kinds of cabs—single seat for two; double seat for four.

Fare either by the "hour" or the "course," at the option of the hirer ("course" any distance without stoppage).

Fares—Two-place cab, 2f. per hour; 1·50 f. per course; four-place cab, 2·25 f. per hour; 1·70 f. per course.

Driver's usual gratuity, 5 sous per hour; 3 or 4 sous per course.

Extra charge between 12·30 night and 7 morning.
„ „ when taken from "Remise" (coach-house).
„ „ beyond the fortifications.
„ „ for luggage.

Ticket containing full particulars of authorised charges always to be given by the driver on entering his cab.

Omnibus Fares.—30 centimes (3d.), inside; 15 centimes (1½d.), outside.

Money.—Gold:—20 francs, 10 francs, and 5 francs. Silver:—5 francs, 2 francs, 1 franc, ½ franc, and 20 centimes. Copper:—10 centimes (2 sous) = 1d.; 5 centimes (1 sou) = ½d. £1 = 25 francs, usual exchange.

Artizans' Visit to Paris.

Her Majesty's Government have granted to the Society of Arts, in aid of the fund now being raised by the Society for assisting workmen, specially selected from various trades, to visit and report on the Paris Exhibition, the sum of £500, conditional on the Society raising a like amount by public subscription.

The following is the list of subscriptions up to the present date :—

H.R.H. the Prince of Wales, President ..	£31	10	0
Her Majesty's Government (conditional)..	500	0	0
Society of Arts	105	0	0
Earl Granville, K.G.	5	0	0
Lord de L'Isle	10	0	0
Thomas Twining	2	2	0
Sir J. P. Boileau, Bart.	5	0	0
George Godwin, F.R.S.	1	1	0
Vice-Chancellor Sir W. Page Wood, F.R.S.	10	0	0
W. H. Bodkin (Assistant-Judge)	3	3	0
Sir Rowland Hill, K.C.B.	3	3	0
Benjamin Shaw	2	2	0
Alfred Davis	10	10	0
Eugène Rimmel	5	5	0
Frederick Mocatta	2	2	0
James Marshall	2	2	0
Robert Dawbarn	1	0	0
Henry Vaughan	10	10	0
Philip Sancton	5	0	0
Somerset A. Beaumont	5	0	0
Decimus Burton, F.R.S.	1	0	0
W. Botly	1	1	0
Professor Robert Bentley	2	2	0
John Stuart Mill, M.P.	1	1	0
G. F. Wilson, F.R.S.	2	2	0
Henry Creed	1	1	0
The Marquis of Salisbury, K.G.	10	0	0
D. Roberton Blaine	2	2	0
William Hawes	2	2	0
Seymour Teulon	1	1	0
G. N. Hooper	2	2	0
Lord Taunton	5	0	0
Henry Cole, C.B.	1	0	0
A. Robb	1	1	0
S. Andrews	1	1	0
Thomas Dixon	1	1	0
Charles Telford	1	1	0
Edmund Burke	2	0	0
W. H. Gore Langton, M.P.	5	0	0
J. R. Fowler	1	0	0
John Rutson	1	1	0
W. Fothergill Cooke	2	2	0
J. P. Gassiot, F.R.S.	5	5	0
The Duke of Devonshire	10	0	0
Messrs. Chawner and Co.	2	2	0
Chas. Brooke, F.R.S.	1	1	0
T. Chappell	2	2	0
C. Candy	2	0	0
Alfred Haines	2	2	0
Major-General Sir William Gordon, K.C.B.	2	2	0
Bartlett Hooper	2	2	0
F. Richardson	1	1	0
J. Sharples	3	3	0
Carry forward	£799	11	0

Brought forward	£799	11	0
Henry Johnson	2	2	0
C. Skipper, jun.	1	1	0
G. T. Saul	1	1	0
Alderman D. H. Stone	5	5	0
G. H. Walker	1	1	0
R. Worthington	2	2	0
A. W. Miles	2	2	0
J. Harris Heal	2	2	0
John Bell	1	0	0
Messrs. Mander and Co.	2	2	0
B. S. Cohen	1	1	0
John Corbett	1	1	0
J. Zaehnsdorf	0	10	6
Major-General Viscount Templetown, C.B.	5	0	0
J. Pearce	3	3	0
Messrs. Huntley and Palmer	2	2	0
A. Glendining, jun.	1	1	0
A. Trevelyan	2	2	0
S. Harrington	1	1	0
Montague Ainslie	2	2	0
James Bentley	2	2	0
Capt. R. P. Oldershaw	1	0	0
E. C. Tufnell	2	2	0
Samuel Redgrave	1	1	0
Joseph Lockett	2	2	0
Messrs. Spicer, Bros.	4	4	0
John Tolhurst	1	1	0
Lord Ebury	5	0	0
C. Lawson	1	0	0
John Horton	1	1	0
W. Baker	1	1	0
Henry Briggs	1	1	0
James Heather	1	1	0
H. Reader Lack	1	1	0
C. Silvy	1	1	0
William Browne	1	1	0
T. Kibble	1	1	0
C. Garland	1	1	0
Antonio Brady	2	2	0
Collected in response to a Circular issued by the Birmingham Chamber of Commerce.			
G. Dixon, M.P., Birmingham	5	5	0
Messrs. Smith and Wright, Birmingham ..	5	5	0
Messrs. Griffiths and Browett, Birmingham ..	5	5	0
Henry Weiss, Birmingham	2	2	0
W. H. M. Blews, Birmingham	2	2	0
W. Middlemore, J.P., Birmingham	5	5	0
Thomas Lloyd, Birmingham	2	2	0
Messrs. Elkington and Mason, Birmingham ..	5	5	0
Messrs. John Hardman and Co., Birmingham	2	2	0
Messrs. F. and C. Osler, Birmingham ..	5	5	0
The Proprietors of the *Birmingham Journal and Daily Post*	2	2	0
The Proprietors of the *Birmingham Gazette* ..	2	2	0
R. L. Chance, Birmingham	2	2	0
T. Avery, Birmingham	2	2	0
W. Tonks and Sons, Birmingham	2	2	0
W. Lucas Sargant, Birmingham	2	2	0
— Mountain (Messrs. Walter, May, and Co.), Birmingham	2	2	0
J. A. Williams, Birmingham	2	2	0
Henry Charlton, Birmingham	2	2	0
W. Bartlett and Sons, Birmingham	5	0	0
John P. Turner, Birmingham	0	10	6
W. H. Avery, Birmingham	2	2	0
Messrs. Peyton and Peyton, Birmingham ..	3	3	0
James Cartland, Birmingham	2	2	0
Messrs. Smith and Chamberlain, Birmingham	2	2	0
Messrs. Baker and Son, Birmingham ..	2	2	0
Messrs. Hinks and Wells, Birmingham ..	2	2	0
Messrs. Van Wart and Co., Birmingham ..	5	0	0
Messrs. Evans and Askin, Birmingham ..	2	2	0
C. Shaw, Birmingham	2	2	0
James Barwell, Birmingham	1	1	0
Total	£958	0	0

Messrs. J. M. Johnson and Sons have kindly placed at the disposal of the Council a number of their five-shilling English Catalogues of the Exhibition, sufficient to present each workman with a copy.

Subscriptions may be forwarded to the Financial Officer, at the Society's House.

The Council are now prepared to receive the names of any workmen recommended by their respective trades as fit and proper persons to undertake this important duty on behalf of their fellow workmen. A certain number have already been selected, and some of them are now in Paris.

Proceedings of Institutions.

Banbury Mechanics' Institute.—At the last half-yearly meeting, held March 21st last, the report presented spoke of the continued prosperity of the Institute. At the commencement of the half-year the Committee determined to arrange for a more systematic course of lectures during the winter months than in previous years, and the attendance has been a decided improvement upon past years. It appears that at the previous half-yearly meeting a question was raised, whether, from the absence of the mechanic element, the simple title of Institute, or Literary Institute, would not be more correct; and one of the earliest subjects considered by the committee was how the absence of mechanics could be accounted for, and what plan, if any, could be adopted to induce a larger number of these to unite themselves with the Institute. Negotiations were opened with the committee of the Recreation Society—the largest number of artisans in the town, and an offer was made, which, if accepted by the members of this Institute, would have brought a large increase to the number, and so removed the ground of complaint, as a very fair proportion of the members would have been strictly mechanics. At a full meeting of the committee the proposal was accepted, but at an extraordinary general meeting of the members of the Institute it was rejected, and so the matter rests. Books to the amount of £11 have been purchased for the library. During the half-year now elapsing the committee has been requested to take charge of a scientific library given to the town by Mr. Samuelson, and has devoted a room to this purpose, and they hope to receive from other gentlemen of the neighbourhood donations of scientific books, so as to constitute this a valuable library of reference. The balance-sheet shows that the total receipts have been £102 6s. 7d.; and payments £89 5s. 11d.; leaving a balance in hand of £13 0s. 8d.

Belfast People's Literary Institute.—The report for last year says that there has been an increase in the number of subscribers; in January, 1866, there were 268, and in January, 1867, there were 288. The educational classes have been eminently successful, some of them having as many as 50 members; it is believed that they have been the means of inducing not less than 80 subscribers to join the Institute. They comprise English, book-keeping, arithmetic, mathematics, and French. The English class has been largely attended and highly appreciated by the pupils. The book-keeping class was opened for the first time, and has been most popular. The mathematical class has also been well attended. The Committee have at length obtained possession of the premises in Queen-street, belonging to the late Mechanics' Institute. They have consequently taken steps to have the entire premises let to the best advantage, and trust to have a still more favourable report to make at the next meeting. The treasurer's report shows that £12 has been received as donations during the past year; and the Committee intend continuing their efforts in this direction.

EXAMINATION PAPERS, 1867.

The following are the Examination papers set in the various subjects at the Final Examination held in April last:—

(*Continued from page* 593.)

MAGNETISM AND ELECTRICITY.

THREE HOURS ALLOWED.

1. Give some experimental illustrations of magnetic attraction, repulsion, and induction.

2. What are the *Isoclinal lines?* Describe the distribution of terrestrial magnetism.

3. How are the errors of a ship's compass ascertained? and by what means may the *quadrantal deviation* be corrected?

4. Explain the phenomena of diamagnetism; and mention some substances by which this property is most powerfully manifested.

5. In what manner are magnetic and electric energy directionally related? Illustrate the relation experimentally.

6. What are the leading properties of an electrified body?

7. To what phenomenon in light and heat is electrical induction analogous?

8. Explain the construction and action of an electrophorus.

9. What is meant by the potential of a voltaic current?

10. Explain the construction of Daniell's battery, and the reasons for its constancy.

11. Explain the construction of a thermopile, and state its chief uses.

12. What evidence does a thermo-electric element afford of the dynamic nature of electricity?

13. Explain the structure and action of the electric organs in some animal.

14. What relations exist between a voltaic current and muscular contraction?

15. Describe the construction of the Morse telegraph.

16. Describe the construction and use of a relay.

17. Explain the structure of some efficient submarine cable.

18. Explain the mode of testing a "fault" in an electric cable and assigning its locality.

LIGHT AND HEAT.

THREE HOURS ALLOWED.

GEOMETRICAL OPTICS.

1. Enunciate the law of the ordinary refraction of light at the surface of a transparent medium. When we look directly down through the surface of water at objects below the surface, show how to find their real depth compared with their apparent depth. Explain how a straight rod, placed obliquely in water, appears to an eye above it to be broken at the surface of the water.

2. Show what is the correct form for the mirror of a light-house, supposing the flame of the lamp to be very small. If the flame is large, what effect has that circumstance on the beam of reflected light? Show the construction of Gregory's reflecting telescope, with the positions of the images.

3. If a small diverging pencil of rays falls directly on a *concave* spherical surface of a *refracting* medium, show how to find the focus from which the refracted pencil diverges. Apply the result to find the effect of concave lenses on diverging pencils. Show how the images of objects seen through concave lenses appear diminished in magnitude.

4. Explain the construction of the Galilean telescope. Show how its magnifying power arises, and state its disadvantages.

PHYSICAL OPTICS.

5. State the evidence by which it is concluded that light is propagated with intervals which differ, for the different colours of the solar spectrum. What is the value, approximately, of the luminiferous interval in *green* light. Describe some method of measuring the luminiferous interval for a given colour.

6. Explain the construction of the *double image* rhomb. Show how a polariscope is formed in the French instruments by means of a double image rhomb for the polarizer, and another double image rhomb for the analyzer. What advantages and disadvantages have these forms of polariscopes.

7. Explain what is meant by the diffraction of light. If a telescope, in focus to show distinctly the image of a distant luminous point, has a piece of wire gauze placed before the object-glass, describe the appearance seen on looking through the eye-glass. How are the appearances in this and similar cases explained?

8. When a plate of a *biaxal* crystal, cut perpendicularly to the line bisecting the angle between the optic axes, is placed between the polarizer and analyzer of the polariscope, describe the appearances witnessed when the eye is near the plate, for different relative positions of the polarizer and analyzer. Give the names of some biaxal crystals.

HEAT.

9. Explain what is meant by the *conduction* of heat. Describe some method of determining the conducting powers of solid bodies. Give the names of some of the substances which have the best conducting powers for heat in their order.

10. Explain the cause of the discrepancies in the readings of the spirit, the mercurial, and the air thermometers. Which of these has been generally taken for the standard thermometer to which the others are compared? Give the reasons for that choice.

11. Describe a method of measuring the elastic force of the vapours of liquids at high temperatures, and generally when it is greater than that of the atmosphere. How have many of the gases been brought to the liquid and some to the solid state?

12. Explain the construction and mode of action of the *high pressure* steam engine. Show the circumstances in which it becomes the most advantageous form of steam-engine.

CHEMISTRY.

THREE HOURS ALLOWED.

No candidate is allowed to answer more than three questions in each division.

FIRST DIVISION.

1. How is chlorine usually prepared? What impurities is it liable to contain?

2. What are the chief constituents of coal gas? How can each of them be obtained in a pure state?

3. Is atmospheric air a compound or a mixture? Describe experiments by which you could prove the correctness of your opinion?

4. Describe and explain a process for the preparation of sulphuretted hydrogen? Describe by equations the action of the gas in the following compounds, viz.: potassic hydrate, ferric chloride, arsenious acid.

5. How are nitrates detected when present in large quantity? How are mere traces of them detected?

6. What weight of air is needed for the complete combustion of a ton of carbon?

SECOND DIVISION.

1. What are the common constituents of pig iron? How is pure iron obtained on a large scale?

2. What is the most abundant ore of antimony? What are its most characteristic chemical reactions?

3. Describe the preparation and properties of the several substances denoted by the formula $Hg\ Cl^2$, $Hg^2\ Cl^2$, $Hg\ O$, $Hg\ S$?

4. A white precipitate is obtained by the addition of hydrochloric acid to a solution containing metallic salts? What may the precipitate contain; and how would you examine it?

5. How is bleaching-powder made? What compounds does it contain? How would you judge of its quality?

6. How is lime separated from magnesia?

Third Division.

1. Describe the manufacture of acetic acid; also the reactions of the acid?

2. How is glycerine obtained from tallow? Give its formula and chief reactions?

3. A given sample of cane sugar is suspected to contain some uncrystallisable sugar. How would you ascertain whether such is the case?

4. Describe the preparation of tannin from gall-nuts? What is the action of dilute sulphuric acid in tannin?

5. How would you separate starch and woody fibre?

6. Describe the process of dyeing by indigo?

MINING AND METALLURGY.

THREE HOURS ALLOWED.

1. Describe the various ores of zinc, and their usual method of occurrence.

2. From what source is the principal supply of silver derived?

3. How would you determine the amount of lead contained in a sample of rich galena?

4. Describe the method of smelting iron ores in the blast furnace.

5. Describe the process employed for smelting lead ores, with the addition of metallic iron.

6. Name the most important ores of iron, and give their several compositions.

7. What do you understand by a mineral vein?

8. Describe the mechanical preparation of copper ores.

9. How is coke prepared from small coal or *slack*?

10. Describe the method of securing a pit with iron *cribbing*.

11. By what process is steel usually manufactured in this country.

12. Describe the Patio process of amalgamation.

(To be continued.)

TECHNICAL EDUCATION.

The following report has been made by the Schools Inquiry Commission:—

We, the Commissioners appointed to inquire into the education given in schools not comprised within the scope of your Majesty's two recent Commissions of Inquiry into the state of Popular Education, and of certain public schools, bearing date respectively the thirtieth day of June in the twenty-second year, and the eighteenth day of July in the twenty-fifth year of your Majesty's reign, humbly submit to your Majesty the following Report:—

Our attention has been incidentally called to the evidence considered to be afforded by the International Exhibition at Paris, of the inferior rate of progress recently made in manufacturing and mechanical industry in England compared with that made in other European countries. It has been stated to us that this alleged inferiority is due in a great measure to the want of technical education, and we have therefore thought it desirable to ascertain from many eminent English jurors in this department whether they agree with this opinion.

We think it expedient at once to report to your Majesty the answers which we have received to our inquiry on this point. Although they have an obvious bearing on the propriety of encouraging to a large extent the study of physical science in our schools, and especially in schools used by those classes which are probably destined to the pursuit of manufacturing industry (a question which had already engaged much of our attention, and to which we hope more fully to advert in our general report), yet we have not considered that an inquiry into technical education came directly within the scope of our Commission, nor could we now undertake it without interposing a longer delay in making our report than we should wish. But considering the great importance of the subject, we venture to suggest for the consideration of your Majesty's Government whether a special inquiry into the state and effects of technical education abroad, and particularly in France, Germany, and Switzerland, should not be instituted, in whatever manner may appear to your Majesty's Government best calculated to obtain full and accurate information about it. Witness our hands and seals this second day of July, 1867.—Taunton, Chairman; Lyttelton; W. F. Hook; F. Temple; Anthony W. Thorold; Thomas Dyke Acland, jun.; Edward Baines; W. E. Forster; P. Erle; John Storrar; H. J. Roby, Secretary.

To this report is appended the following correspondence:—

From Dr. Lyon Playfair to Lord Taunton, Chairman of the Schools Inquiry Commission.

[This letter has already appeared in the *Journal* of June 7th.]

(Circular.)

Schools Inquiry Commission, 2, Victoria-street, S.W., May 30, 1867.

Sir,—I am instructed by Her Majesty's Schools Inquiry Commissioners to send to you a copy of a letter lately addressed to their chairman by Dr. Lyon Playfair, and to request that you will favour them by stating whether you agree with the substance of that letter.—I have, &c., H. J. Roby.

The above circular was sent to some eminent jurors and others. The answers which have been received are from the following gentlemen. The name of the subject with which they were respectively connected is added in italics:—

Dr. David Price. (*Iron.*)
Prof. Tyndall, F.R.S., Royal Institution, Albemarle-street. (*Physics.*)
J. E. McConnell, C.E. (*Locomotives.*)
James Young, Esq., of Limefield by West Calder. (*Chemical Manufactures.*)
J. Scott Russell, Esq., F.R.S. (*Naval Architecture.*)
Captain Beaumont, R.E., Junior United Service Club. (*General Machinery.*)
Peter Graham, Esq., of Jackson and Graham's, Oxford-street. (*Furniture and Carpets.*)
E. W. Cooke, R.A. (*Glass and Artistic design.*)
E. Huth, Esq., of Leeds. (*Woollens.*)
W. Spotten, Esq., Belfast. (*Flax.*)
R. Mallet, Esq., C.E. (*Engineering.*)
Rev. Canon Norris, M.A. (*Education.*)
Prof. Frankland, F.R.S., Royal Institution, Albemarle-street. (*Chemistry.*)
John Fowler, Esq., Pres. I.C.E.
Warington W. Smyth, Esq., F.R.S., School of Mines, Jermyn-street. (*Mining.*)
A. J. Mundella, Esq., Nottingham. (*Hosiery, &c.*)

1. *From Rev. Canon Norris, M.A., late one of her Majesty's Inspectors of Schools.*

June 3, 1867.

My Lord,—During my four weeks' work at Paris as the English juror of Class 89 (primary instruction), I had more than one conversation with English jurors of other classes on the subject to which Dr. Lyon Playfair's letter has invited your lordship's attention.

Two questions are raised by that letter:—

1. Is England really losing her advanced position in those industries which involve the application of science to production?

2. If so, is it due to our comparative backwardness in the teaching of what, for shortness sake, is called applied science?

In reply to the first question I must say that, without any exception, it seemed to be the impression of those with whom I spoke on the subject. Only with special reference to one of the grounds on which Dr. Playfair bases his judgment I would venture to suggest some caution. I do not think that a comparison of the awards made to the several nations by the International Jury is a trustworthy evidence of the respective merits of those nations.

The upshot of my experience of the jury work was this, that these international exhibitions had already outgrown the conditions under which the justice of such awards could be considered at all certain.

However, Dr. Playfair's opinion is by no means made to rest on this ground only. He speaks from a large and independent knowledge of the subject; and, as I have said, I found the opinion universal among those with whom I spoke.

I come then to the second question:—Assuming that we are making less industrial progress than France, Austria, and Prussia, how far is this due to England's backwardness in the technical education of her artizans?

And here, very deliberately, I must confess that my examination of the things sent from Austrian, French, and Prussian schools, compared in my own mind, not with what England sent (for we were not at all fairly represented), but with my own knowledge of what England might have sent, led me to believe that while in the matter of primary education we were (to say the least) well abreast of those three nations, yet in the matter of higher instruction, of all that tends to convert the mere *workman* into the *artizan*, Austria, France, and Prussia were clearly passing us.

I have, &c., J. P. Norris.

The Lord Taunton, &c., &c.

2. *From John Tyndall, Esq., F.R.S., Professor of Physics in the Royal School of Mines.*

June 3, 1867.

Sir,—I hardly think that an Exhibition in Paris furnishes the means of accurately testing the comparative merits of English and French education.

The simple inconvenience of transport tends to render England worse represented than France.

Still on other grounds I would express a general concurrence in the views of Dr. Playfair. The facilities for scientific education are far greater on the Continent than in England, and where such differences exist, England is sure to fall behind as regards those industries into which the scientific element enters.

In fact, I have long entertained the opinion, that in virtue of the better education provided by continental nations, England must one day—and that no distant one—find herself outstripped by those nations, both in the arts of peace and war. As sure as knowledge is power this must be the result.

I am, &c., John Tyndall.

H. J. Roby, Esq., &c., &c.

3. *From Edward Huth, Esq.*

Oakfield Lodge, Huddersfield,
June 3, 1867.

Sir,—I have read with much interest the letter of Dr. Lyon Playfair, addressed to Lord Taunton, on the industrial or want of industrial education in England, a copy of which was enclosed in your favour of the 31st of May. The great experience and high authority of Dr. Playfair might almost be sufficient to prove his case. I, as a humble individual, can only say that I agree with him *in toto*.

Having closely examined the woollen textile fabrics during the Exhibition in 1851, and having acted as juror for these fabrics in the Exhibition of 1862, as well as the present one in Paris, I had opportunities of comparing the progress that has been made by various countries in this important branch of industry.

I am sorry to say that, although we may still be unsurpassed in many of our productions, we no longer hold that pre-eminence which was accorded to us in the Exhibition of 1851.

Although an industry which has attained a considerable state of perfection does naturally not advance in ten years as rapidly as the one which was at that period less fully developed, I fear that the enormous strides that have of late been made by our continental rivals in France, Belgium, Prussia, and Austria, will make it daily more difficult for our woollen manufacturers to hold, not only their former prominent position, but even in many cases to maintain their present one.

It is high time that not only the Government, but that every individual who loves his country should make thorough inquiries into the causes of such a state of things.

Like Dr. Playfair, I made it a point during my stay in Paris to converse with many English as well as foreign jurors on this point.

I found my (for a long time previously entertained) convictions entirely confirmed, that it is the want of industrial education in this country which prevents our manufacturers from making that progress which other nations are making. From all I could see and learn I found both masters and foremen of other countries much more scientifically educated than our own.

This, however, is not all. The workmen themselves of other countries have a far superior education than ours, many of whom have none whatever. Their productions show clearly that there is not a machine working a machine, but that brains sit at the loom, and intelligence stands at the spinning wheel.

Seeing and feeling the results of this as thoroughly as I do, you must permit me for one moment to travel beyond the contents of Dr. Playfair's letter, and ask of what use is an industrial scientific education to our working population if they have not had a good elementary education to begin with?

This, I know, opens a wide and fruitful subject of controversy, but one which one day must be grappled with, and the sooner this is done the better it will be for England.

Voluntary education has done much, but the progress is too slow, and the great question is, whether compulsory education must be resorted to.

This, I know, will grate harshly on many an ear, and so it did on mine some years ago.

Seeing what it has done for other countries, and being convinced that a good general education is the great secret of their rapid strides in art and manufacture, I have entirely changed my opinion, and I am glad to say that the many eminent men in different stations of life with whom I have conversed in Paris on this subject are all of the same opinion.

Let wiser heads than mine find out the right way to accomplish this and to make it acceptable to all.

Let this national elementary education once be established throughout the country, and you have a fine nucleus for scientific industrial schools, in nearly all our manufacturing towns at least, in our Mechanics' Institutions, wherever such institutions are properly conducted.

Pray excuse me for going so far beyond the inquiry contained in your letter; my only plea for doing so is the deep interest I feel in education and the advancement of all branches of industry in England.

I have, &c.,
Edward Huth.

H. J. Roby, Esq.,
Schools Inquiry Commission, London.

4. *(Second Letter.)*

Oakfield-lodge, Huddersfield,
July 1st, 1867.

Sir,—A short absence from home prevented me from returning the enclosed sooner.

To avoid misunderstanding I desire to make only one remark in explanation of what I say about Mechanics' Institutions forming a nucleus for scientific industrial schools.

Of course I do not mean to say that our Mechanics' Institutions could do the work of the higher industrial schools, which I should like to see established by Government for those who are able to pay a reasonable price for the instruction they receive in them.

But if a general system of sound elementary education were to be introduced in this country, our Mechanics' Institutions could take a far higher standing in the promotion of scientific instruction to the really working population, instead of being compelled, as they now are, to confine themselves almost exclusively to elementary instruction. I have, &c.,

Edward Huth.

H. J. Roby, Esq., &c., &c.

5. *From Edward Frankland, Esq., F.R.S., Professor of Chemistry in the Royal School of Mines.*

Royal College of Chemistry, 315, Oxford-street, W.
June 4, 1867.

Sir,—I am favoured with your communication of the 31st ult., enclosing a letter addressed by Dr. Lyon Playfair to the Chairman of Her Majesty's Schools Inquiry Commissioners, and requesting me to state whether I agree with the substance of that letter. In reply I beg to say that Dr. Lyon Playfair's communication substantially expresses my own convictions in regard to the matters therein mentioned.

As a juror in Class 44 of the present Paris Exhibition, I was not only forcibly struck by the want of evidence of progress in the different branches of chemical manufactures carried on in Great Britain, but still more so at the great advances made by other nations, but more especially by Germany, France, and Switzerland, in respect of such manufactures since the year 1862, when, as a juror in the corresponding class, I had also on opportunity of comparing the chemical manufactures of different nations.

I quite agree with Dr. Playfair in referring this want of progress in the manufactures of this country chiefly to the almost utter lack of a good preparatory education for those destined to take part in industrial pursuits. This great defect in the school and college education of England affects the masters and managers of our factories even more deeply than the workmen themselves. The former have but rarely had any opportunities of making themselves acquainted with the fundamental laws and principles of physics and chemistry; they therefore find themselves engaged in pursuits for which their previous education has afforded them no preparation, and hence their inability to originate inventions and improvements. It is true that such men not unfrequently imagine themselves inventors, and the yearly files of patent specifications abound with instances of their so-called inventions. The great loss of time and money attending these futile patents would be rendered impossible by a very moderate, if accurate, knowledge of chemical and physical science.

In the polytechnic schools of Germany and Switzerland the future manufacturer or manager is made familiar with those laws and applications of the great natural forces which must always form the basis of every intelligent and progressive industry. It seems that at length this superiority in previous training is more than counterbalancing the undoubted advantages which this country possesses in raw material.

I have, &c., E. Frankland.

H. J. Roby, Esq., &c., &c.

6. *From John Fowler, Esq., Pres. I.C.E.*

2, Queen-square-place, Westminster, S.W.,
June 5, 1867.

Sir,—I find it difficult to answer your question precisely in the terms in which you put it.

I do not quite agree with Dr. Playfair that a comparison can be usefully made between Exhibitions so nearly together in time as those of 1862 and 1867, nor that "little inventiveness" and "little progress" in the peaceful arts have been lately made by this country.

With these reservations, however, I may say that I agree generally with that which may be considered the substance of the letter, viz., that foreign nations have made greater manufacturing progress than England since the Exhibition of 1851.

This, in fact, was the opinion which I publicly expressed on the 8th May, at the annual dinner of the Institution of Civil Engineers, and I have been glad to see a confirmation of it by Dr. Playfair and others.

I am, &c., John Fowler.

H. J. Roby, Esq., Schools Inquiry Commission,
2, Victoria-street.

7. *From James E. McConnell, Esq., C.E.*

Dean's-yard, Westminster, S.W.,
June, 7, 1867.

Sir,—I have read Dr. Lyon Playfair's letter to Lord Taunton on the subject of the position which England occupies in the great industrial competition in Paris.

I agree with Dr. Playfair in his views generally, and am satisfied as to the comparatively small progress we have shown since 1862, and the great advance which continental nations have made during that period.

In the class of which I was juror for England (No. 63) I made a very careful examination and comparison of our locomotive engines, carriages, and railway machinery, apparatus, and material as shown by this country, with the same articles exhibited by France, Germany, and Belgium.

I am firmly convinced that our former superiority either in material or workmanship no longer exists; in fact, there are engines shown there made in France and Germany equal to those of the best English makers.

It requires no skill to predict that, unless we adopt a system of technical education for our workmen in this country, we shall soon not even hold our own in cheapness of cost as well as in excellence of quality of our mechanical productions.

I found that on the Continent there are now a number of workmen's schools established, in which a clever mechanic can qualify himself for any scientific position in his business.

In England our Mechanics' Institutions are more like reading clubs. Classes are neglected, and in consequence when a good workman is selected for a foremen's place, he is generally found wanting in technical knowledge.

We have treated our workmen too much like a machine, but this must be remedied if we are to maintain our ground.

Having for about 25 years superintended large numbers of English workmen, I can speak on this point practically.

Fully impressed with the great importance of this subject, I invited several of my brother jurymen and exhibitors to meet at our hotel in Paris, to consider the best course to adopt in the matter. At one of these meetings we had the pleasure of Dr. Playfair's attendance.

I may mention that I hear a movement has already begun to draw the attention of the public in England to the subject, and sums of money have been offered by individuals to assist the object. It appears to me, however, that Government should take the matter in hand, and the public funds should be forthcoming to establish these technical schools, not in London, but in the districts where the operations requiring such knowledge are being carried on.

Thus there ought to be mining schools in South Wales, Staffordshire, and Durham, and machinery and engine schools in like manner placed in Manchester, Glasgow, &c., &c.

It will afford me much pleasure, and I shall be ready to be of service if required in this matter in which I feel the greatest interest, and know to be nationally of vital importance. I have, &c.,

James E. McConnell.

H. J. Roby, Esq., &c., &c.

8. *From Capt. Frederick Beaumont, R.E.*

71, Avenue Champs Elysées, Paris,
June 10, 1867.

Sir,—In reply to your letter of the 30th ultimo, in which you are good enough to ask, by order of Her Majesty's Schools Inquiry Commissioners, my opinion on a letter addressed to them by Dr. Lyon Playfair, I have the honour to state that in the substance of that letter I concur. Speaking only with reference to machinery, the department with which I am immediately connected, there can be no doubt as to the immense strides which foreign mechanical engineering has lately made, notably, I think, in the case of France and Belgium, and by which they are rapidly overtaking the industrial power of Great Britain.

My impression is that this advance has been greatly owing to a successful copying of English designs, and to the use of English machine tools. Of course, did the foreigners merely confine themselves to copying, they would never surpass us, but while following that which in our mechanical designs is good, they are also seeking (and that not unsuccessfully) to apply theoretical knowledge in a way which, to my humble judgment, shows that they will soon have little to learn from us.

I would allude notably to the economical use of steam, though no doubt their inventive faculties have there been quickened by the high price of fuel on the Continent. I cannot, from my own knowledge, speak of the means of instruction available to the working public abroad, but I have always understood it to be superior to our own; and assuming it to be so, I cannot conceive any reason which would better than that account for a difference of industrial progress.

I trust I may not be deemed presumptuous in stating what I believe to be a very great want in England, viz., such an institution as the well-known "Arts et Metiers" of Paris. I know of no national institution where the public of our own country may study practical mechanics and the arts appertaining thereto. Such a one would, in my opinion, be valuable, not only to working men and their superiors, but to engineers. It should be an evidence of the most advanced mechanical knowledge of the country; and while teaching primarily through the eye by the models and machines exhibited, it would naturally form the focus of other means of instruction by lectures, classes, &c.

I apprehend it is only when taken up by Government that such an institution would assume proportions sufficient to be really effective as a means of national education.

I have, &c.,
Fred. Beaumont,
Capt. R. Engineers.

H. J. Roby, Esq., &c., &c.

9. *From Warington W. Smyth, Esq., M.A., F.R.S., Lecturer on Mining and Mineralogy in the Royal School of Mines.*

28, Jermyn-street, S.W.,
June 14, 1867.

Sir,—I have the honour to acknowledge the receipt of your letter of the 31st ultimo, inquiring, for Her Majesty's Schools Inquiry Commissioners, whether I agree with the substance of Dr. Playfair's letter of the 15th ultimo, addressed to Lord Taunton.

Having gone carefully, as juror, through the objects exhibited in Class 47 at the Paris Exhibition, and having also examined with much interest many of the productions in Class 40, as well as other portions of the Exhibition, I am bound to admit that our British portion of the display was generally meagre and defective, partly from tolerably obvious causes. I was not so much struck by this lack of fair representation of many of our branches of industry, as I was by the decidedly greater progress which has been made of late years by several of the Continental nations, and that too in several departments which used formerly to be considered almost exclusively our own.

As regards the broad question of technical education, I will only add, that the greater proportional advancement made by France, Prussia, and Belgium in mining, colliery working, and metallurgy, appears to me to be due, not to the workmen, but in great part to the superior training and attention to the general knowledge of their subject, observable among the managers and sub-officers of the works. No candid person can deny that they are far better educated, as a rule, than those who hold similar positions in Britain. I have, &c.

Warington W. Smyth.

H. J. Roby, Esq., &c., &c.

(To be continued.)

PARIS EXHIBITION.

The collection of arms has just been increased by an enormous cannon, produced at the Imperial foundry at Ruelle, within the last few months; it consists of a cast-iron body, strengthened by two steel coils. The weight of this piece, which is intended for port service, is said to be 37 tons; the diameter of the chamber is rather less than 17 inches; it is a smooth-bore breech-loader. Its projectiles are, a solid spherical shot, of 600lbs. weight, and a shell of the same form, weighing 420lbs., and containing 18lbs. of powder; and the charges for the two respectively 100lbs. and 66lbs. It is mounted on a cast-iron carriage; and a small crane, like that employed in England, fixed on one side of the carriage, serves to place the projectile in the mouth of the gun. This enormous piece of ordnance is of a long, bottle-like shape, longer in proportion to its diameter than either the Prussian or English monster gun. The weight of the carriage and its appurtenances is given as 29 tons, making a total weight of 66 tons. The gun stands close to the bridge which crosses the quai and facing the river, and around it are arranged specimens of the various pieces used in the French navy, namely, rifled cast-iron guns of 27, 24, 19, and 16 centimetres calibre, and bronze 12 and 4-pounders for gun-boats. It is a formidable exhibition.

The Emperor and Empress have recently paid a visit to the great Omnibus restaurant in the grounds of the Exhibition, and the Duc de Persigny and some other gentlemen dined there the other day *incognito*, partaking of the ordinary fare, in order to test the quality. A report has also been made, by order of the Imperial Commission, and a few extracts from this document will be found interesting, and may be of service to English workmen visiting the Exhibition.

Since the 8th of April, when the restaurant was opened, the number of customers amounted to 365,000 persons, who have spent in all 494,500 francs, giving an average of 3,600 meals per day, at the rate of 1s. 2d. each. The report only comes down to the middle of July, since which time, it is said, the number of daily visitors has reached an average of 5,713. The extent of the establishment is indicated by the preceding figures, but it may be added that the number of persons employed there amounts to 220. Numbers of the delegates from the French provinces and foreign countries, bodies of working men from various factories, orpheonists, and military musicians, have made use of the restaurant, and the dinners served to them have varied from 1s. 2d. to 2s., the highest price. Most of the visitors to the Exhibition have tested the Omnibus restaurant, and the reports are generally very favourable, especially as regards the abundance to be had for the money expended, and the civility of the attendants, who are almost all women. It should be added that visitors are not fixed by any rule, but may merely take a basin of soup if they please. The prices of the dishes have already been given in the *Journal*.

Amongst the means which have been brought in aid of the visits of the working classes, the encampment, established by a commission formed for the special purpose of encouraging such visits, deserves to be specially mentioned. It is close to the Exhibition, in the Avenue Rapp, and consists of a series of wooden huts, arranged

much in the same way as in a camp, and comfortably fitted up. The military musicians from various countries who visited Paris recently, were accommodated, to the number of 650, in the encampment for fifteen days, without any inconvenience; these musicians included Austrians, Prussians, Russians, Spaniards, Dutch, Bavarians, and Belgians. About 500 men from Perche, in the Orme, are now installed in the camp.

The grand banquet of the exhibitors, at which, it is said, the Emperor will be present, is at last definitely fixed for the 16th inst. It is expected that there will be twenty thousand persons present. It is to be held in the Hippodrome.

Fine Arts.

Schools of Art.—It is reported that 99 schools of art are now in operation, five of which are new during the last year. Upwards of seventeen thousand students are receiving instruction in art in these central schools, and the total numbers taught drawing in all central schools, schools for the poor, and night classes, are over one hundred and five thousand. The fees received exceed eighteen thousand pounds. These figures, after due allowance made under recent minutes, indicate some slight increase on previous years. It is also reported that the art scholarships, lately instituted for the purpose of making the art schools of the country and the art collections at South Kensington bear more directly on manufactures and industries, have attained the end contemplated. It appears that two national art scholars are engaged in carrying out the decorations of the Kensington Museum, and two more are also now modelling decorations in terra-cotta for the Wedgwood memorial in the Potteries. Students in the etching class are under the instruction of Mr. Lane, A.R.A. Thirty-nine art schools throughout the country, that is, more than one-third of the total number, have borrowed works from the Kensington Museum as aids to study. Under recent minutes thirty-two "night art classes" have been established, for pupils above 12 years of age, in parochial schools and working men's institutions, which number is after the rate of nearly one night class for three towns possessing central schools throughout the country. Schools for the poor have now control over the art instruction of their pupils, and assist in the conduct of annual examinations. It appears that 560 of such schools have already availed themselves of recent provisions made in furtherance of national art education, and that 80,084 children in these schools have been taught drawing during the past year. The number of prizes awarded to art schools and classes generally has considerably diminished; the Department, it was understood, considered that prizes had of late been in excess.

The Paris Exhibition.—The select committee appointed to consider and report on the advisability of making purchases from the Paris Exhibition for the benefit of the Schools of Science and Art in the United Kingdom, and any other means of making that Exhibition useful to the manufacturing industry of Great Britain and Ireland, have considered the matters to them referred, and agreed to the following report:—"1. They are of opinion that it is desirable that purchases should be made at the Paris Exhibition of objects of art and science, especially of such as illustrate modern scientific inventions and discoveries, and the application of art to manufactures, and that the exhibition of such objects in the Museum of South Kensington, and, by circulation, in local museums in different parts of the United Kingdom, would be useful to the manufacturing industry of the country, and for the artistic and scientific instruction of the schools in connexion with the Science and Art Department. 2. That as one of the principal objects of such purchases should be to show the progress made by other nations in manufactures, and in the application of art and science to practical purposes, examples of foreign origin should, in the first place, be secured in preference to those of British production. 3. That it is not desirable that pictures and modern statuary sculpture should be purchased. 4. That, considering the importance of such purchases to the development of the manufactures and trade of the United Kingdom, they recommend that a liberal grant be asked from Parliament for the purpose of making them. They have not sufficient data before them to enable them to suggest the sum which might be advantageously expended, but they consider that under no circumstances should it exceed £25,000. 5. Lastly, they are of opinion that no objects should be purchased at the Paris Exhibition except such as shall be recommended by a commission consisting of gentlemen distinguished for artistic and scientific attainments, who should consult with the two art referees attached to the Department of Science and Art, and other competent persons. They further think it desirable that the referees should furnish written reports upon the objects recommended by them for purchase."

Manufactures.

French Wages and Workmen.—A report rendered to the Foreign-office this year by Mr. Julian Fane, secretary of embassy at Paris, speaks of wages of skilled artizans in various towns in France as ranging from 5f. to 10f. a day; for inferior workmen, from 2½f. to 3½f.; for workwomen in a clothing establishment, from 2f. to 4f. or 5f.; for children, from 1f. to 2f. The general rate of money wages in France may be said to have increased about 40 per cent. in the last 15 years, but the rise in money wages has been accompanied by a very considerable rise in the price of the ordinary articles of consumption and in rent of lodgings, so that the improvement in the position of the labourer, meaning his power to supply himself with the necessaries and comforts of life, has been far from commensurate with the rise in the money value of his labour. Still, the relative proportions in which money wages and the price of commodities have risen leave a margin in favour of the former, and to this extent there has been a rise in real wages, enabling the labourer to feed, lodge, and clothe himself somewhat better than he could 15 years ago. This has been the natural consequence of the rapid development of industrial enterprise and the increased demand for labour; and it may also have been affected by the greater facilities afforded to the labourer by the influence of opinion, and recently by legislation, to claim a larger share in the profits of production. It is difficult to estimate the relative price of labour in England and France. The rate of money wages may be higher in one country than in the other, but no just comparison can be instituted unless the quantity and quality of labour supplied in each case are fairly appraised. It is a question which only experts can decide, and they differ upon it. Combinations to influence the rate of wages were formerly punished in France as misdemeanours, but three years ago a law was passed, under which they are not illegal unless accompanied by violence (including insults), or menace, or fraudulent manœuvres, including false representations. Ample advantage has been taken by the workmen of this change in the law. There is scarcely a trade in France whose members have not combined in the last three years for the purpose of increasing the rate of wages and diminishing the duration of labour, and their efforts to this end have usually met with success. The employers, for the most part, assert that the law has proved to them an unmitigated evil, submitting them to the tyrannous coercion of the employed. Various forms of the co-operative system are in course of trial in France, with a view to prevent or lessen this collision of interests. The association of masons, for instance, is one that has met with remarkable success;

some of the workmen are shareholders, and others are engaged as ordinary labourers, and have no share in the profits, while some members of the association are simply holders of capital. In other establishments the workmen are allowed to share in the profits of the business by means of rewards or prizes allotted to them, or to the more worthy among them, by the proprietors at the end of the year, or by facilities for procuring food, clothing, lodging, and education for their children on advantageous terms. Mr. Fane gives it as his judgment that the fault in the organization of the co-operative societies has been generally too much faith in the combination of skill and labour, and too little regard for the advantage of capital; and that the workman should aim at becoming, in some measure, a capitalist himself, by the aid of societies of consumption enabling him to effect savings in expenditure, before he seeks to become a co-operator with the capitalist in industrial enterprise.

Commerce.

The Central Pacific Railway.—The chief difficulties apprehended in the construction of the great railroad to the Pacific, high mountain crossings and winter snow obstructions, seem to have been, to a large extent, overcome. The two mountain ranges had to be crossed at elevations of over 7,000 feet, or nearly three times the height of any railway lines hitherto built in America. Experience shows that it is entirely practicable, and that the deep snows are not likely to prove very serious obstacles. The Central Pacific Railroad of California, the western end of the great national route, commencing at Sacramento in 1863, encountered, at the outset of its career, the mountain difficulty in its worst form; the dreaded Sierras had to be overcome within the first hundred miles. In November last, however, it had carried its track nearly to the summit, and had demonstrated the feasibility of the whole mountain passage with less average engineering resistance than that with which the Alleghanies are crossed. During an unusually severe winter it has been successfully worked as far as built. It has had large working parties on the Summit Pass, so as to convince its officers that the fear of impassable snow-drifts is groundless. Only three days have the trains failed to make the regular trips. From Sacramento to Cisco station, the present terminus, is 94 miles, in which 5,911 of the total 7,042 feet of ascent is made. This portion embraces the heaviest and costliest portion of the work. The ascent is continuous; once gained, it is never lost, the average rate being 75 feet to the mile; the maximum, 116 feet to the mile, of which there are but 3½ miles. The bulk of the heavy gradient is at 105 feet to the mile, with numerous level intervals interspersed. Thirty per cent. only of the distance is occupied by curves, none of which have a radius of less than 573 feet. The Baltimore and Ohio Railroad has 17 miles, in two stretches of 116 feet grade, with curves of 400 feet radius; and the Virginia Central for many years worked with the unaided locomotive grades of 296 feet to the mile, and ruling curves whose radii were 300 feet. By crossing from one spur and ridge to another, piercing by a number of short tunnels and deep cuts where necessary, the line has been made available for passenger trains to run at 25 miles an hour, and goods trains at half that speed. The time consumed in making the trip, including stoppages, is six hours, with ordinary engines and trains. From Cisco to the Summit most of the heavy rock cutting is now done. The crest of the ridge is pierced by a tunnel of 1,658 feet, the longest on the road, of which about 500 feet remain uncut, and at which men are working night and day the week round, excavating at the rate of seven feet per day. East of the summit the descent is much easier, the great interior basin being elevated 4,000 feet above the sea level. In 14 miles there is a fall of 1,100 feet, after which there is a gentle slope, nowhere exceeding 45 feet to the mile, eastward toward Salt Lake. The greater portion of the line is so sheltered by excavations that it will be necessary to erect sheds over it for two miles only, in order to shoot the snow-slides clear of the track. Provision is made in the larger tunnels and heavy cuttings for a double line, which, from present indications, will be necessary at no distant day, to accommodate the growing traffic. The original estimated cost of building the road across the Sierras was slightly above that of the most expensive railroads in the country where the right of way had to be purchased at considerable cost; and compared as follows:—

	Per Mile. Dollars.
Boston and Providence Railroad cost	81,273
Boston and Lowell Railroad cost	78,636
New York and Erie Railway about	80,000
Hudson River Railroad about	80,000
Central Pacific (Mountain Division) estimated	88,400

Up to the 1st January last the Central Pacific Company had expended in building the 94 miles in operation, together with about a third of the preparation upon 25 miles additional, and for a liberal equipment of rolling stock, nearly 15,000,000 dollars. The total cost of this mountain section will be about 100,000 dollars per mile. The rest of the distance to Salt Lake City, 575 miles, can be constructed for about 60,000 dollars per mile.

Colonies.

The State of Queensland.—With such a small population in proportion to the extent and value of its territory, Queensland is dependent on immigration for its prosperity and the development of its resources. The wealth of the colony in land and minerals is only in process of discovery. Every year increases the knowledge of what can be profitably extracted from the soil or from beneath the surface. This wealth cannot be rendered available without a constant inflow of population for years to come; nor can it be done by a mere increase of numbers, without reference to their suitability for colonists, or to the other surrounding circumstances. It has been experienced that the sudden arrival, in large numbers, of people without any means, but entirely dependent on the receipt of wages from the day of their landing, so disarranges the relative proportion of employers and employed as to cause much misery, and even to give the appearance, for a time, of a superabundance of population in some districts. This evil cannot be cured by a total stoppage of immigration of every sort, though it necessitates a cessation of that particular description which has been carried on to excess for some time past, and a large portion of which has been a source of loss to the colony. The present position of this country is by no means an exceptional one. Every young community, unless it absolutely stands still, like Western Australia, or retrogrades, like Tasmania, is sure to have a recurrence of periods of undue inflation, followed by seasons of more or less prostration. Old residents of each of the Australian colonies will all testify to the fact that every one of them has, in its turn, passed through far harder times than have been seen here. They have invariably and quickly recovered, through having their energies forcibly directed to the necessity of increased production; and the prosperity which has followed has been in proportion to the increase of numbers attracted by those resources the availableness of which has been proved in consequence of the pressure of the times.

The Alpaca in New South Wales.—A Sydney paper says:—"It is unfortunate that the attempts to naturalise the alpaca near Sydney have not been successful. For some time those in Paramatta-park did very well, but several have died lately, and the

number is reduced to three. It is intended to remove these to higher land, under care of some member of the society who may be willing to take charge of them."

Education, &c., in Victoria.—This colony expends £130,000 per annum in furnishing the people with the means of instruction, and three-fourths of the whole population are able to read, and nearly two-thirds to read and write. It maintains a free public library, containing over 40,000 volumes, besides a museum of art and a museum of the natural sciences; there are institutions for the relief of almost every conceivable form of human suffering; there are about 1,700 places of public worship; upwards of 300 branches of various benefit societies, with a revenue exceeding £60,000 per annum; nearly 18,000 savings' bank depositors, with more than £700,000 standing to their credit, besides £15,000 lodged in the Post-office savings' bank. There are upwards of 900 manufactories, with a capital exceeding two millions sterling, giving employment to 10,000 people; the export and import trade represents an aggregate of over £26,000,000, being more than £42 per head. There are upwards of 276 miles of railway in operation, and more than three thousand miles of telegraph wires.

Agriculture in Victoria.—The harvest returns of 1866 show that about 6,000,000 bushels of wheat, oats, and barley, and 83,166 tons of potatoes were raised; and the calculations of the Registrar-General show that there are about one hundred head of cattle, 14,000 sheep, 20 horses, and about 12 pigs to every 100 men, women, and children in the colony. At present the skilled labour receives from 8s. to 10s. for eight hours' labour; the farm labourer 8s. to 12s., with board and lodging; day labourers, 5s. to 7s. per day; and female domestics, £25 to £30 per annum; while bread is 6d. per loaf, and meat 6d. per pound. There has been a steady decline in wages during the last 13 years, which is mainly to be traced to the cessation o immigration.

Emigration in 1866.—The following is a statement of the number of persons who emigrated from England to the Australian and New Zealand colonies last year, showing a decrease of not less than 13,186 persons, as compared with the number in 1865:—

New South Wales	1,648
Queensland	6,054
Victoria	8,531
South Australia	3,392
West Australia	167
Tasmania	7
New Zealand	4,298
Total	24,097

Notes.

International Co-operative Congress.—An international congress is announced to take place in Paris, on the 16th, 17th, and 18th of the present month of August, under the presidency of a well-known writer on political economy, M. J. E. Horn. The questions to be discussed are: 1st. The division of profits amongst members of co-operative societies, and the application of funds to various purposes; 2nd. The correspondence of co-operative associations in France, and between those and foreign associations; 3rd. The utility of these associations in agricultural districts, and the means of furthering the movement in that direction; 4th. The application of co-operation to public instruction by means of libraries, adult classes, and instruction of various kinds; 5th. The liability of members of co-operative societies beyond their subscriptions. Foreign associations are invited to send delegates to represent them at the congress. The fee is fixed at ten francs, which confers a right to a copy of all publications of the congress. The council announces that strangers may address the meetings of the congress in their own language, arrangements having been made for giving immediately a *resumé* of such speeches in French. The meetings are to be public, admission to be obtained by payment of half a-franc. Subscriptions received at the offices of the Société du Crédit au Travail, 3, Rue Baillet, Paris.

Fire-proof Dress.—M. Champy, a lieutenant in the French navy, has just exhibited at Billancourt an ingenious arrangement, of his invention, to enable persons to approach the centre of a conflagration, in order to suppress it, or to save other persons from the flames. The principle of his invention may be stated in a few words,—the wearing of a dress continually saturated with water. He places over his head a conical woollen hood, with eye-pieces, dresses himself in woollen garments and gloves, and fastens a strong belt round his waist, from which depend the branch in connection with a fire-engine, and a tube with a stop-cock, by means of which he can saturate the conical cap and all the rest of his equipment. Some faggots saturated with benzine were set on fire, and in a few seconds M. Champy put on his dress, saturated it with water, and, approaching close to the burning mass, extinguished the fire without difficulty.

General Cemetery for all Paris.—An inquiry has been opened by the authorities of Paris on a subject which has been for some time under consideration, namely, the formation of a general cemetery for the whole metropolis, at a spot near Pontoise, in the department of the Seine and Oise, distant about twenty miles from Paris, and of a special railway in connexion with it. Outlines of the project are now open to the public at the Prefecture of Paris and the sub-prefecture of St. Denis; and all persons interested in any way in the subject are invited to make their observations, in books kept for the special purpose, between this and the 16th of August.

Great Musical Prize in France.—The Institute of France has, at the instance of the Academy of the Beaux Arts, conferred the biennial prize of 20,000 francs on M. Félicien David, author of the "Desert," "Herculaneum," "Lalla Rookh," and many other works.

Museum of the City of Paris.—The municipal museum now being formed at the Hôtel Carnavalet in Paris will, it is said; be shortly opened to the public. It will comprise eight sections or divisions:—1. Charters and original manuscripts relative to the history of Paris. 2. Seals, medals, and tokens. 3. Sculpture, and objects of archæology. 4. Prints and miniatures. 5. Pictures representing various important events which have occurred in Paris, the monuments and the aspect of the city, or persons famous in its history. 6. Books published in Paris. 7. Specimens of the productions of the principal trades. 8. Furniture, and historic costumes.

Scientific Balloon Ascents in France. — M. Flammarion made his eighth ascent the other day, with a companion, in a balloon of moderate size, called the "Imperial." In order to make certain observations it was necessary that the aëronauts should pass at least once through the rain and through the clouds which yielded it, and this object was accomplished; they passed the whole night in the region of the meteors, one occupied with the direction of the balloon, the other with his observations. Leaving Paris early in the evening, they passed the frontier into Belgium about midnight, near Rocroi, having passed to the right of the towns of Daunnartin, Soissons, and Laon. Afterwards passing to the left of Namur, Liege, and Aix-la-Chapelle, the balloon entered Prussia at the break of day. Before midnight it rained, and the balloon had great difficulty in piercing the clouds; but after that time the sky became clear, and the moon shone brightly. Before daybreak M. Flammarion was principally occupied with observations respecting the formation of the clouds, and during this time they were between 5,000 and 8,000 feet above the surface of the earth. At the latter elevation at daybreak, the thermometer

stood at 2° centrigrade. The observations generally referred to the condensation of the watery clouds and the temperature of the air in the upper regions. At five in the morning the aëronauts found themselves over the Rhine, and their ballast being exhausted, they thought it prudent to descend, which they did near Solingen, in the department of Düsseldorf, about ten leagues from Cologne, and four hundred miles from Paris. M. Flammarion intended to make a second ascent, and with this view three small balloons were attached to the larger one, whereby the last was kept inflated during the whole day, but the second ascent was not attempted, probably on account of the unfitness of the weather. Previous to the ascent above referred to, another was made in the great balloon the "Giant," but the rents in the silk, and the weight of the car and its contents, marred the intended voyage.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 24th July, 1867.

263. Bill—Weights and Measures (Dublin).
269. ,, District Lunatic Asylums Officers (Ireland) (amended).
271. ,, Poor Law Board, &c. (amended).
272. ,, Offices and Oaths (Lords Amendment).
399. East London Water Bills, &c.—Report from the Select Committee.
429. Factory Acts Extension and Hours of Labour Regulation Bills—Report from the Select Committee.
433. Paris Exhibition—Report from the Select Committee.
436. Corrupt Practices at Elections Bill—Minutes of the Proceedings.
449. East India (Army)—Return.
465. Navy—Supplementary Estimate (Vote No. 1, Wages to Seamen and Marines).

National Education (Ireland)—Thirty-third Report of the Commissioners.

Donaghmore Riot—Report of the Commissioners, &c.

Delivered on 25th July, 1867.

274. Bill—Merchant Shipping.
402. Loan Societies—Abstract of Accounts.
444. Population of Towns—Returns.
445. Mortality and Marriages—Return.
447. Oyster and Mussel Fisheries—Report of the Board of Trade.
461. Civil List Pensions—List.

Delivered on 26th July, 1867.

221. Bill—Companies Act (1862) Amendment.
268. ,, Sea Coast Fisheries (Ireland) (amended).
273. ,, Parks Regulation (amended).
275. ,, Pier and Harbour Orders Confirmation (No. 2) (Lords Amendments).
276. ,, Consecration of Churches and Churchyards.
277. ,, Prorogation of Parliament.
278. ,, Patriotic Fund.
280. ,, Indemnity.
281. ,, Bank Post Bills (Ireland).
443. Sea Coast Fisheries (Ireland) Bill—Report from the Select Committee.
459. Brentwood Grammar School—Correspondence.
463. Trinity College (Dublin)—Returns.
469. Civil Services—Supplementary Estimate.

Science and Art Department—Fourteenth Report.

Colonial Possessions—Statistical Tables (Part XI., 1864 and 1865).

Delivered on 27th July, 1867.

283. Bill—Guarantee of Government Officers (amended).
427. Poor Relief (Ireland)—Abstract of Return.
558. Brown's Charity—Correspondence.
474. Ecclesiastical Residences—Return.

Public Petitions—Thirty-fifth Report.

Delivered on 29th July, 1867.

222. Bill—Sea Fisheries.
284. ,, Public Health (Scotland) (amended in committee on re-commitment and on second re-commitment).
285. ,, Fortifications (Provision for Expenses) (No. 2).
287. ,, Courts of Law Fees, &c.
289. ,, Naval Stores (No. 2).
441. Grand Jury Cess (Ireland)—Return.
457. Poor Law—Return.
460. Thames Conservancy—General Report.
464. Simla Court Martial—Proceedings.
464. (i) Simla Court Martial—Despatch.

Delivered on 30th July, 1867.

261. Bill—Intestates' Widows and Children (Scotland).
416. Public Debts—Return.
466. Army—Returns.
473. National Education (Ireland) (Denominational System)—Answers.

Delivered on 31st July, 1867.

288. Bill—Expiring Laws Continuance.
291. ,, Dominica Loan.
46. (vi.) Trade and Navigation—Accounts (30th June, 1867).
457. Poor Law Return (corrected).
472. National Education (Ireland) (Classics and French)—Proposal or Plan.
485. Quarantine Regulations—Return.

Ceylon—Petition.

Patents.

From Commissioners of Patents' Journal, August 2nd.

Grants of Provisional Protection.

Aeronautical apparatus—2115—J. W. Butler and E. Edwards.
Alcohol—2011—W. E. Newton.
Boiler tubes, cleaning—2086—J. Mannock.
Boilers—2107—T. D. Walker.
Boots and shoes—782—A. W. Moore and E. McNeal.
Boxes, drawers, &c.—1715—G. P. Hill.
Brick-making machinery—2128—R. Shaw and J. Stirk.
Button fastenings—2093—C. M. Tate.
Carding engines—2112—R. T. Bradbury and T. Bottomley.
Casks, &c., cleaning—2135—J. Walker.
Cotton, ginning—2087—W. McAndrew.
Fabric, woven—1189—J. D. Brickles.
Fluids, &c., induction of—2106—A. Morton.
Gas—2004—J. J. Buckley and C. Hook.
Glass for tablets, &c.—1914—G. Rees.
Glass, furnaces for manufacturing—2075—F. D. Nuttall.
Looms—2103—W. R. Lake.
Looms—2111—J. J. and E. Harrison.
Meat, &c., preservation of—2079—T. Redwood.
Metal bars, bending, &c.—2105—W. Barningham and J. Thompson.
Paper-making machinery—2085—G. W. Hayes.
Petticoats—1459—A. Angot.
Pictures, &c., suspending—2129—W. Potts.
Pipe joints—2124—A. Budenberg.
Plaster castings, hardening, &c.—2131—B. P. Franzoni.
Printing machines—1534—A. M. Clark.
Printing machines—2113—A. Paton.
Railway carriages, &c., ventilating—2126—W. G. Creamer.
Railway crossings, &c., preventing accidents at—2123—C. F. Whitworth.
Railway points and signals—2119—J. Saxby.
Reaping and mowing machines—1952—R. Hellard.
Rudders—2118—P. H. Metham.
Smoke, consuming, &c.—2099—S. C. Lister.
Spanners—2108—J., J., and T. Palmer.
Spinning machines, &c.—1932—J. Elce and P. Williams.
Steam engines—2101—J. R. Swann.
Steel, &c., utilizing products obtained during the manufacture of—2114—J. Hargreaves.
Tables—1533—O. Rodolphe.
Taps—2133—H. Lea.
Types, printing from a chain of—1948—J. McAdams.
Ventilators—2130—J. Hooper.
Wine, &c., escape of carbon from casks of—2122—T. Bromwich.

Invention with Complete Specification Filed.

Lamps in carriages, securing—2157—W. Howes and W. Burley.

Patents Sealed.

315. I. Liebich.
324. J. G. Tongue.
325. J. Wright and T. Cobley.
330. G. A. Waller.
344. G. E. Pain and C. Corroy.
346. R. E. Green & W. Laycock.
350. F. C. Leader.
358. W. S. Losh.
366. T. Gill.
371. J. Brigham & R. Bickerton.
392. J. H. Johnson.
1335. E. Bourdon.
1338. R. Marsden & U. Bromley.
1598. A. V. Newton.
1658. I. M. Milbank.

From Commissioners of Patents' Journal, August 6th.

Patents Sealed.

343. W. G. Beattie.
347. W. T. Carrington.
360. T. Sibley.
361. H. A. Fletcher.
368. R. Haworth & J. W. Welch.
369. G. Daws.
377. C. W. Dixon.
378. E. Gorges.
384. R. T. Thompson.
395. F. Bacon.
399. A. J. Paterson.
426. J. Combe.
428. J. Ferrabee.
430. E. Lord.
496. T. King.
569. W. E. Newton.
677. M. A. F. Mennons.
1717. S. W. Wood.

Patents on which the Stamp Duty of £50 has been Paid.

1981. W. Clark.
2118. J. Campbell.
1941. F. Cruickshank.
1944. A. Long.
2136. A. E. Peirce.
1920. J. H. Johnson.
1926. E. Frasier.
1931. C. Garton and T. Hill.
1932. A. L. Wood.
1940. G. E. M. Gérard.
1952. J. Lee.
1946. G. F. Druce.
1951. J. Heydon.

Patents on which the Stamp Duty of £100 has been Paid.

1856. J. Goucher.
1887. J. Rives.
1979. W. Walton.
1895. J. Higgins and T. S. Whitworth.

Journal of the Society of Arts.

FRIDAY, AUGUST 16, 1867.

Announcements by the Council.

Artizans' Visit to Paris.

Her Majesty's Government have granted to the Society of Arts, in aid of the fund now being raised by the Society for assisting workmen, specially selected from various trades, to visit and report on the Paris Exhibition, the sum of £500, conditional on the Society raising a like amount by public subscription.

The following is the list of subscriptions up to the present date :—

H.R.H. the Prince of Wales, President	£31	10	0
Her Majesty's Government (conditional)	500	0	0
Society of Arts	105	0	0
Earl Granville, K.G.	5	0	0
Lord de L'Isle	10	0	0
Thomas Twining	2	2	0
Sir J. P. Boileau, Bart.	5	0	0
George Godwin, F.R.S.	1	1	0
Vice-Chancellor Sir W. Page Wood, F.R.S.	10	0	0
W. H. Bodkin (Assistant-Judge)	3	3	0
Sir Rowland Hill, K.C.B.	3	3	0
Benjamin Shaw	2	2	0
Alfred Davis	10	10	0
Eugène Rimmel	5	5	0
Frederick Mocatta	2	2	0
James Marshall	2	2	0
Robert Dawbarn	1	0	0
Henry Vaughan	10	10	0
Philip Sancton	5	0	0
Somerset A. Beaumont	5	0	0
Decimus Burton, F.R.S.	1	0	0
W. Botly	1	1	0
Professor Robert Bentley	2	2	0
John Stuart Mill, M.P.	1	1	0
G. F. Wilson, F.R.S.	2	2	0
Henry Creed	1	1	0
The Marquis of Salisbury, K.G.	10	0	0
D. Roberton Blaine	2	2	0
William Hawes	2	2	0
Seymour Teulon	1	1	0
G. N. Hooper	2	2	0
Lord Taunton	5	0	0
Henry Cole, C.B.	1	0	0
A. Robb	1	1	0
S. Andrews	1	1	0
Thomas Dixon	1	1	0
Charles Telford	1	1	0
Edmund Burke	2	0	0
W. H. Gore Langton, M.P.	5	0	0
J. R. Fowler	1	0	0
John Rutson	1	1	0
W. Fothergill Cooke	2	2	0
J. P. Gassiot, F.R.S.	5	5	0
The Duke of Devonshire	10	0	0
Messrs. Chawner and Co.	2	2	0
Chas. Brooke, F.R.S.	1	1	0
T. Chappell	2	2	0
C. Candy	2	0	0
Alfred Haines	2	2	0
Major-General Sir William Gordon, K.C.B.	2	2	0
Bartlett Hooper	2	2	0
Carry forward	£795	7	0

Brought forward	£795	7	0
F. Richardson	1	1	0
J. Sharples	3	3	0
Henry Johnson	2	2	0
C. Skipper, jun.	1	1	0
G. T. Saul	1	1	0
Alderman D. H. Stone	5	5	0
G. H. Walker	1	1	0
R. Worthington	2	2	0
A. W. Miles	2	2	0
J. Harris Heal	2	2	0
John Bell	1	0	0
Messrs. Mander and Co.	2	2	0
B. S. Cohen	1	1	0
John Corbett	1	1	0
J. Zaehnsdorf	0	10	6
Major-General Viscount Templetown, C.B.	5	0	0
J. Pearce	3	3	0
Messrs. Huntley and Palmer	2	2	0
A. Glendining, jun.	1	1	0
A. Trevelyan	2	2	0
S. Harrington	1	1	0
Montague Ainslie	2	2	0
James Bentley	2	2	0
Capt. R. P. Oldershaw	1	0	0
E. C. Tufnell	2	2	0
Samuel Redgrave	1	1	0
Joseph Lockett	2	2	0
Messrs. Spicer, Bros.	4	4	0
John Tolhurst	1	1	0
Lord Ebury	5	0	0
C. Lawson	1	0	0
John Horton	1	1	0
W. Baker	1	1	0
Henry Briggs	1	1	0
James Heather	1	1	0
H. Reader Lack	1	1	0
C. Silvy	1	1	0
William Browne	1	1	0
T. Kibble	1	1	0
C. Garland	1	1	0
Antonio Brady	2	2	0

Collected in response to a Circular issued by the Birmingham Chamber of Commerce.

G. Dixon, M.P., Birmingham	5	5	0
Messrs. Smith and Wright, Birmingham	5	5	0
Messrs. Griffiths and Browett, Birmingham	5	5	0
Henry Weiss, Birmingham	2	2	0
W. H. M. Blews, Birmingham	2	2	0
W. Middlemore, J.P., Birmingham	5	5	0
Thomas Lloyd, Birmingham	2	2	0
Messrs. Elkington and Mason, Birmingham	5	5	0
Messrs. John Hardman and Co., Birmingham	2	2	0
Messrs. F. and C. Osler, Birmingham	5	5	0
The Proprietors of the *Birmingham Journal and Daily Post*	2	2	0
The Proprietors of the *Birmingham Gazette*	2	2	0
R. L. Chance, Birmingham	2	2	0
T. Avery, Birmingham	2	2	0
W. Tonks and Sons, Birmingham	2	2	0
W. Lucas Sargant, Birmingham	2	2	0
— Mountain (Messrs. Walter, May, and Co.), Birmingham	2	2	0
J. A. Williams, Birmingham	2	2	0
Henry Charlton, Birmingham	2	2	0
W. Bartlett and Sons, Birmingham	5	0	0
John P. Turner, Birmingham	0	10	6
W. H. Avery, Birmingham	2	2	0
Messrs. Peyton and Peyton, Birmingham	3	3	0
James Cartland, Birmingham	2	2	0
Messrs. Smith and Chamberlain, Birmingham	2	2	0
Messrs. Baker and Son, Birmingham	2	2	0
Messrs. Hinks and Wells, Birmingham	2	2	0
Messrs. Van Wart and Co., Birmingham	5	0	0
Carry forward	£952	15	0

Brought forward	£952	15	0
Messrs. Evans and Askin, Birmingham ..	2	2	0
C. Shaw, Birmingham	2	2	0
James Barwell, Birmingham..	1	1	0
Messrs. Chance and Co., Birmingham ..	5	5	0
Total	£963	5	0

Messrs. J. M. Johnson and Sons have kindly placed at the disposal of the Council a number of their five-shilling English Catalogues of the Exhibition, sufficient to present each workman with a copy.

Subscriptions may be forwarded to the Financial Officer, at the Society's House.

The Council are now prepared to receive the names of any workmen recommended by their respective trades as fit and proper persons to undertake this important duty on behalf of their fellow workmen. A certain number have already been selected, and some of them are now in Paris.

Proceedings of the Society.

Society's Visit to Paris.

The Society's visit to Paris terminates this day. Nearly two hundred cards of membership were issued, and a considerable number of the members availed themselves of the facilities afforded them for visiting the various manufacturing establishments and other objects of interest in the French capital.

Food Committee.

The following observations are quoted from the special correspondent of the *Chemical News*, in reference to the display of Chemical and Pharmaceutical Products shown in the Class 44, Paris Exhibition :—

Numbered 7 in the English catalogue (8 in the *Catalogue Général*), we find "Borwick, George, 34, Chiswell-street, London. Baking powder, chemicals, spices, &c.;" and we are also referred to p. 132 of the appendix for further details. What can induce anyone to exhibit baking powder we are really at a loss to imagine. It certainly is not a subject of any scientific interest; it is not a novelty; it is not interesting in appearance; its mere physical character offers no guarantee of its purity, and, in fact, its negative qualities preponderate so largely, that positively we are astonished that its exhibitor did not (like a great firm of blacking manufacturers) obtain a medal. And yet this baking powder, so insignificant in appearance, so uninteresting in a scientific point of view, so unfit, therefore, for exhibition, is, measured by a commercial standard, of far more importance than many objects that rivet our attention by their beauty or scientific interest. We have been credibly informed that a fortune has been made by its sale.

Then what is this baking powder out of which fortunes have been or are to be made? Of the composition of the powder of Borwick we know nothing, but Cooley's powder is as follows:—Tartaric acid, $\frac{1}{2}$ lb.; bicarbonate of soda and potato farina, or British arrow-root, of each $\frac{3}{4}$ lb. (each in powder); separately dry them *perfectly* by a very gentle heat, then mix them in a dry room, press the mixture through a sieve, and at once put into packets, observing to press it hard, and to cover it with the foil or close-made paper, to preserve it as much as possible from the air and moisture. Delfort's formula principally differs in the addition of *alum* (!) and carbonate of ammonium. With the addition of a little turmeric the compound becomes the "Egg-powder" so often seen in the windows of grocers and oil-men. These mixtures are used in domestic economy as substitutes for yeast in bread and butter in pastry, and are in their way, and in their proper places, useful, although humble adjuncts to the *materia* (may we not say *medica*) of the non-professional cook. There is no doubt that by enabling pastry to be made equally light, and with one-third less butter, the better class of baking powders have prevented many a bilious and dyspeptic attack.

Mr. Borwick, in addition to his baking powders, exhibits what he terms "ozonized cod-liver oil." We are sorry to find cod-liver oil "repeating" itself in our notices of the chemical and pharmaceutical products in the French Exhibition, but we will not allow the unsavoury nature of the subject to turn us from our duty. We consider "ozonized cod-liver oil" to be the greatest of the many delusions connected with this useful food—for food it is purely and simply, and the sooner medical men understand its true character the better for their patients.

Mr. Borwick's prospects states that the impregnation of cod-liver oil with ozone is for the purpose of "conveying artificially to the lungs of the delicate and consumptive, without the effort of inhalation, and in larger proportions than found in the atmosphere, this extraordinary life-giving agent." The prospectus concludes with the following somewhat rash paragraph:—"In fact, it is now proved beyond doubt, that ozone is to the weak, delicate, and consumptive, what quinine is to those who are affected with fever—*the nearest approach to a specific yet discovered.*" The italics are those of Mr. Borwick.

Now, it appears to us that this prospectus has certain points of resemblance to the three incompatible pleas anent the cracked pot, viz:—"1st. That it was cracked when we borrowed it. 2nd. That it was whole when we returned it. 3rd. That we never had it at all." For, in the first place, a distinguished chemist who purchased some and examined it, came to the conclusions — 1st, that it did not convey ozone to the lungs of the delicate and consumptive; 2nd, that if it did, it was not to the weak, delicate, and consumptive, what quinine is to those who are affected with fever; and, 3rdly, that it did not contain ozone at all. It is really inconceivable how any one with even a smattering of chemical knowledge could imagine, even if the oil did contain ozone, that it would carry it to the lungs. The trifling fact that the oil has to be digested before it can enter the blood seems to escape the believers in this so-called remedy. That certain oils acquire powerfully oxidizing properties on exposure to light and air we admit, but it must be remembered that in all cases yet known the active oxygen attacks the oil itself as soon as the temperature is raised, and may even attack other oxidizable substances present at the same time. The most remarkable instance of the oxidization of essential oil, is, undoubtedly, that of isoprene; but when ozonized isoprene is distilled (although it boils at about 40°C.) the ozone present attacks the isoprene with violence, and converts it into an oxidized substance. We think, moreover, with the observer of that reaction, that it is doubtful if the oxygen in what we have hitherto termed ozonized oils is really in the state of ozone. The phenomena attending the passage of ozone through tubes of caoutchouc seem to indicate the impossibility of ozone existing (as such) in the presence of oxidizable organic matters.

Even if we admit that consumptive patients are better in an atmosphere which indicates the presence of ozone (or what is assumed to be ozone), what does that really

prove? It seems to us rather to show that consumptive people are better when the air is free from the impurities incompatible with the presence of ozone, than that the ozone is beneficial to them. The reaction indicated by ozone test papers is not the measure of the total quantity originally in the air, but of the residue left after the destruction of the impurities. But enough of this; we trust that the time is fast approaching when medical men will know more, and talk less, about oxygen and ozone. If one did not hear it so often, it would seem impossible, that in these days of education, doctors are still found who tell their patients to go to the sea-side, "where there is more oxygen than in the close and confined streets of towns."

Proceedings of Institutions.

Lancaster Mechanics' Institute.—The forty-first annual report says that although the number of subscribers is slightly less than last year, there seems to be a lively interest in the business of the Institute manifested by those who are identified with it. The number of members on the books is 468, against 493 of last year. The whole interior of the building has been thoroughly cleaned and repaired. There are now 5,643 volumes in the library; the number of volumes issued during the year is 4,265. The classes, which are for French, chemistry, geology, and English, have, with the exception of that for geology, been continued to the end of the session, and although the number of those who attended was but small, yet the importance of instituting such classes will be seen in the success which has attended their continuance during the present year. In addition to these classes, a class for the study of pure mathematics was conducted by the Rev. J. C. Lunn. The number of pupils was 26, the average attendance being 18½. The class continued for thirteen weeks, and, for the time, the pupils made satisfactory progress. The classes which have been commenced this session are a complete success. They are:—Females' writing and arithmetic class (26); females' writing and reading class (26); boys' writing and arithmetic class (28); chemistry class (33); mathematics (22); ladies' French class (9); gentlemen's French class (10); singing class (14); young men's writing and arithmetic class (7); and English language class (55). The museum has been provided with additional accommodation for the fossils and minerals, and considerable time has been spent by Mr. W. Prosser, F.G.S., who at the request of the committee undertook the task of carefully arranging the whole of the collection, so that the new classification should be in accordance with the present aspect of science. The librarian, Mr. Joseph Bell, who for a period of sixteen years has studiously watched the progress of the Institute, having resigned, the committee having, in reply to public advertisement, received 120 written applications, appointed Mr. J. W. Shaw, of Halifax, to the office. The report of the penny bank shows that the receipts for the year ending 27th October, 1866, were £633 0s. 7d., and the total receipts since April, 1860, were £7,280 0s. 1d., the average number of weekly depositors being 239. The accounts show that the expenditure was £297 19s. 10½d., and that there is a balance due to the treasurer of £129 19s. 10d. The committee of the Lancaster School of Art, in making their tenth annual report, record the continued success of the school. The number of sudents who have paid fees for instruction during the year is 841, of whom 85 were artizans. At the annual examination of the Department twenty of the students were successful. The most advanced works executed in the school were also sent to London in competition for prizes, and seven were successful; one work, by W. J. Ralph, has been rewarded by a bronze medallion in the national competition.

EXAMINATION PAPERS, 1867.

The following are the Examination papers set in the various subjects at the Final Examination held in April last:—

(*Continued from page* 601.)

BOTANY.

THREE HOURS ALLOWED.

The candidate is expected to answer correctly three questions in Section I. and six questions in Sections II. and III., including descriptions of at least two of the fresh specimens. Nos. 8, 9, *and* 10 *each stand for an answer.*

Section I.—Structure and Physiology.

1. Define the following terms, and comment upon each, as required:—

Didynamous. Give examples from two Natural Orders.

Gonidia. Where do they occur? What is their function?

Gynandrous. Give examples.

Gynophore. Give example.

2. What are *vessels?* From what Organs and Families of plants are they usually absent?

3. Explain the structure and function of *stamens.*

4. What distinctive features characterise the principal types of *stem-structure?*

5. Describe briefly the process of *reproduction* in flowering plants.

6. Explain the usual conditions to be observed in *hybridising* plants, and the results of this process, both physiological and practical.

Section II.—Systematic and Economic Botany.

1. What is meant by *genus, species, variety?*

2. What genera (giving their Natural Orders) furnish *oil* and *sugar* for economic purposes? Name the part of the plant in each case.

3. Distinguish *Labiatæ* from (1) *Scrophulariaceæ,* (2) *Boraginaceæ,* (3) *Verbenaceæ.*

4. Describe the principal modifications of the *Fruit* in British genera of *Rosaceæ.*

5. Name the Natural Orders and genera to which the British trees with *winged fruits* belong.

6. Upon what ground is importance attributed to the *stamens* for purposes of classification? What characters, afforded by those organs, are made use of in distributing *Dicotyledons* into primary groups?

7. Name the *Natural Order* to which the plants marked A, B, and C respectively belong, with *reasons* for your opinion.

Section III.—Descriptive Botany.

8, 9, and 10. Describe the three plants marked A, B, and C, in the proper sequence of their organs, and in accordance with the examples given in Lindley's "Descriptive Botany" and Oliver's "Lessons" (Appendix).

FLORICULTURE.

THREE HOURS ALLOWED.

1. Is it possible to increase the hardiness of any race of plants, and what are the most likely means by which this may be effected?

2. Name the most useful flowers for the decoration of the conservatory, to be had in bloom during September, October, and November; and indicate how each is to be prepared for blooming at that season.

3. Explain the general features of dissimilarity in the cultivation of Ferns and Succulents, and of Heaths and Orchids.

4. Tabulate the ingredients, in their respective proportions, which should be used in making up a compost for potting the following plants:—Calceolarias, Fuchsias, Camellias, Stocks, Asters, Bletias, Cattleyas, Allamandas, Roses, Dahlias, Crysanthemums, and Rhododendrons.

5. Write down the rules by which you would be guided in proceeding to water the plants in a greenhouse in the month of January, indicating how, when, and why the operation is to be performed. State all the considera-

tions, as far as known to you, which should influence the operator.

6. By what means may the races of cultivated plants be improved, so as to render them more valuable either for use or ornament?

7. Why, when, and how would you ventilate a forcing-house in full action, in the month of March, presuming that it is to be ventilated daily?

8. How would you turn to advantage, in practical floriculture, the limit of temperature, both above and below the mean, endurable without injury by different plants?

9. Show in section (by a pen-and-ink sketch) what you consider the best form of house for the purpose of Propagating plants, also that for growing Roses and Camellias respectively, indicating as far as possible by this means the internal arrangements, and noting the dimensions.

10. Name and briefly describe a dozen of the most distinct and useful plants for what is called "sub-tropical" gardening.

11. Mention as many as you can of the plants which may be propagated by leaf-cuttings, and state from what part respectively they will organise buds.

12. Give a monthly table of the temperature proper for the successful cultivation of each of the following classes of subjects:—Stove plants, Greenhouse plants, and Alpines.

FRUIT AND VEGETABLE CULTURE.

THREE HOURS ALLOWED.

Fruit Culture.

1. Name eight dessert apples which ripen in succession, and state the seasons when they come into use?

2. Name eight dessert pears which ripen in succession, and state the seasons when they come into use?

3. How would you distinguish a Noblesse peach tree when in bloom from a Barrington; and how would you distinguish both from a Royal George?

4. How would you distinguish the Dutch Hamburg grape from the Frankenthal?

5. What are the causes that produce rust in grapes, and how are these to be remedied?

6. Give a list of six Peaches and four Nectarines that will ripen in succession, filling up the space between the 1st of August and the middle of October?

7. Give a list of six Plums and six Cherries that will ripen in succession from the second week in June till October?

8. What is the best season to plant fruit trees; and why is it so?

9. In what way does root-pruning induce fertility in fruit trees?

10. When trees are bark-bound, and produce a weak and languishing growth, and small ill-shapen fruit, what remedy would you adopt?

11. If one of the principal branches on a trained tree were producing shoots of too great luxuriance, while the other branches produced those of ordinary growth, how would you check the over luxuriance so as to preserve the equilibrium of the tree?

12. At what season and in what way should root pruning be performed?

Vegetable Culture.

13. Mention the varieties most worth cultivating in small gardens of the following kinds of vegetables:—Peas, Broccoli, Cabbage, Carrot, Kidney Beans, and Lettuce?

14. What variety of Lettuce would you employ to stand the winter?

15. Give a list of the Wrinkled Marrow Peas with which you would keep up a supply from the first week in June till the end of October, and state the periods when they are to be sown and when they will come into use?

16. How would you distinguish white globe onion from white Spanish?

17. Describe the difference between Champion of England pea and Veitch's perfection, and wherein do both differ from Excelsior Marrow?

18. Wherein does the Altringham carrot differ from the Long Surrey or Studley?

ANIMAL PHYSIOLOGY.

THREE HOURS ALLOWED.

Candidates may answer any four of these six questions, but only four. If any paper is found to contain answers to more than four questions, marks will be given for the first four only of those answers.

1. A piece of bread is eaten. What becomes of it? Trace the changes which its constituents undergo while passing through the animal body.

2. State the chemical and physical differences between *inspired* and *expired* air. Why does an animal die when it is made to breathe the same air over and over again? How much *pure* air ought a man of average size to be supplied with per hour, in order that he may breathe without discomfort?

3. What is meant when animals are spoken of as "cold-blooded" or "warm-blooded?" What is the ordinary temperature of the human body? How is it brought about, and how regulated?

4. In what way does the act of walking differ from running? Explain fully the mechanism in each case.

5. Give a physiological explanation of coughing. Mention other animal actions which seem to you to be of a similar nature.

6. Why does a man frown when he is suddenly exposed to a bright light? By what means is the eye able to adapt itself to a varying intensity of light?

(To be continued.)

TECHNICAL EDUCATION.

(*Continued from page* 604.)

10. *From Robert Mallet, Esq., F.R.S.*

Offices, 7, Westminster-chambers,
Victoria-street, London, S.W., June 17, 1867.

My Lord,—In reply to the question put to me by circular of the 31st ultimo (signed by Mr. H. J. Roby), in reference to the letter of Dr. Lyon Playfair of the 15th ultimo, addressed to your Lordship, a printed copy of which was enclosed to me, I beg to state that,—1st. I do fully agree with Dr. Playfair in opinion that a better system of technical education for all classes connected with industrial pursuits has become a pressing necessity in Great Britain; that immediate steps ought to be taken for organising and securing legislatively such a system; and that large and accurate inquiry as to the state of such education in foreign countries, and as to the want of it at home, ought to be made under such sanction as will be best calculated to rouse the public mind in England from the apathy and ignorance which prevail upon the subject.

The matter is far from new to me. A university education, with a natural love for scientific investigations, the circumstances of my life, in large part engaged as the active managing partner of large engineering works, and of late years as a civil engineer, a more than common travel and knowledge of foreign countries, in their arts and educational systems, &c., &c., have long convinced me that, unless by a vast improvement in our own educational system, general and technical, the pre-eminence of England (whose *power*, more than that of any other empire that has ever existed, is based upon her industry) must decline, and with a rapidly accelerating pace, in relation to the other great nations of the world.

For more than twelve years past I have urged this publicly, and in various ways, for which I refer you to many printed documents in various periodicals, &c., and recently to articles by me in the pages of the *Practical Mechanics' Journal* and *The Engineers' Journal*, as also to my inaugural address, as President of the Institution of Civil Engineers of Ireland, of last year, and to an ad-

dress delivered by me this year before the Society of Foreman Engineers of London, and printed by that Society, &c.

2nd. I do not quite agree with Dr. Playfair in his view of the Paris Exhibition, upon which alone he appears to base his conclusion as to the need of better education, &c.

The degree of representation of the great industries of Great Britain in the Paris Exhibition is no safe test of the relative position of any one industry in Great Britain and abroad. From many circumstances, with which I need not here trouble you, England is in various industries either ill represented, or not represented at Paris at all, while some foreign nations are represented upon a scale preposterously beyond their productive status; for example, in *spinning*, England, the first country as to that in the world, appears almost "no where," while Belgium would, to the superficial eye, appear the greatest spinning country in the world.

My views, therefore, have been formed, not only long before the Paris Exhibition, but independently of it, except in so far as that it has, upon the whole, tended to confirm my previous conclusions. I have, &c.

Robert Mallet, F.R.S., M.A.,
Juror, Cl. 53.

The Right Hon. Lord Taunton.

11. *(Second Letter).*

Offices, 7, Westminster-chambers,
Victoria-street, London, S.W., June 27, 1867.

My Lord,—I presume it is proposed to pursue the subject of technical education in Great Britain, as raised by Dr. Lyon Playfair's letter, by some form of inquiry. 1st. As to the institutions and methods in operation abroad in several countries for securing technical education. 2nd. As to our needs of such in England, and how these may be best supplied. Having long given attention to these matters, I hope I may not be deemed impertinent if I offer a suggestion as to the *mode* by which, as I conceive, the information desirable under the first head may best be secured.

The countries in which the systems of technical education now working are such as to demand our full acquaintance with them, are France, Prussia, Belgium, Bavaria, Switzerland, and Austria, in the first rank at least these.

In all these countries a large quantity of information exists in the form of state and other printed documents, manuals, *brochures*, and treatises on education, &c., &c. These should be collected, and a report should be obtained from each country by a technical and learned native professor, in which the system in his country should be described fully and clearly, and a *resumé* given of all the literature of the subject. The *six* reports thus obtained should go into the hands of some one competent man in England to condense and compare, and report upon, as to *facts only*. You would then have something like an exact basis as to the first head to start consideration upon.

The more usual course with us in England is to *send* out a roving commission of Englishmen to collect information. From want of familiarity with Continental tongues and habits of thought, and from many other causes, my own observation leads me to think that very little information is thus obtained; and that such commissions are little more than holiday excursions at the public expense. For this I could appeal to some printed reports.

From the other course of proceeding I am satisfied a crop of highly valuable information might be expected.

I have, &c.,
Robert Mallet, F.R.S., M.A.

The Right Hon. Lord Taunton.

12. *From Peter Graham, Esq. (of Messrs. Jackson and Graham).*

29, 33, 34, 35, 37, and 38, Oxford-street, W.
June 20, 1867.

Sir,—I have delayed replying to your circular of 31st May until I had the opportunity of obtaining information on some points confirmatory of my impressions on the subject of Dr. Lyon Playfair's letter. I agree with him that a system of technical education must tend to the improvement of the manufactures of every country in which it is in operation, and that the advances made by some other countries may to some extent be attributed to its influence. It must, however, be borne in mind that if we have not made the same relative progress as other nations in some branches of industry, we have made greater relative progress in others (the natural consequence of International Exhibitions and greater freedom of trade), and that the Exhibition at Paris does not fairly represent the progress made since 1862, or the present state of several of our most important manufactures.

I may say, briefly, that of all our great textile manufactures the only ones fully and fairly represented are Scotch tweeds and Irish linens.

I apprehend great danger to our manufacturing interests, and to the general prosperity of our country, from the action and influences of trades unions, which tend to reduce, as far as possible, the intelligent and industrious workman to the same level as the stupid and lazy.

I have, &c.,
Peter Graham.

H. J. Roby, Esq., &c., &c.

13. *From David S. Price, Esq., Ph.D.*

26, Great George-street, Westminster.
June 22, 1867.

My Lord,—I have the honour to acknowledge the receipt of a letter from the Secretary of the Schools Inquiry Commission, requesting that I would favour the committee by stating whether I agreed with the substance of a letter addressed to your Lordship by Dr. Lyon Playfair, a copy of which was enclosed.

Before proceeding to comply with this request I would wish to remark that Dr. Playfair's letter refers to progress in the peaceful arts, as exemplified at the Paris Exhibition, as a whole, and is general in its conclusions.

My time at Paris was almost exclusively devoted to the jury work of my class, a very large one—chemical and pharmaceutical products—and as yet I have only had an opportunity of examining those other sections of the Exhibition in which I take a special interest, the metallurgy of iron, ceramics, ordnance, &c.; it is, therefore, not possible for me to say whether I agree with the substance of Dr. Playfair's letter. I will, however, state my opinion of so much of the Exhibition as came under my notice, and then venture to give my views upon the second part of the letter, which refers to the subject of the technical education of the working man.

As far as relates to chemical products, I consider that the exhibition made by Great Britain is a "deficient representation," and will not enable foreigners to form a correct estimate of the nature and extent of chemical manufactures now carried on in this country.

In reference to the British exhibition of iron and steel, it must not be overlooked that most of our largest ironworks are unrepresented—Mr. Bessemer's, Coalbrook Dale, Weardale, Earl Granville's Shelton, Ebbw Vale, Aberdare, Plymouth, and many others too numerous to name; that Sheffield is only represented by two or three makers—a fact that was considered so remarkable at the time that space was applied for by intending exhibitors, that it was brought to the special notice of the Associate Commissioners invited to confer with His Royal Highness the Prince of Wales at the South Kensington Museum; and that which is shown in Class 44 is, as a rule, injudiciously exhibited, contrasting painfully with the taste and spirit evinced by the French in their arrangements in the same class. Great credit is also due to the French ironmasters for the skill displayed in some departments of manufacture, especially in that of girders—a branch of rolling to which our countrymen have not yet seriously devoted their attention.

Those interested in the metallurgy of iron are much impressed at the wide dissemination which the Bessemer process has attained on the Continent as evidenced in Paris. In reference to the rapid spread of this remarkable invention, it would be instructive if the history of its introduction abroad could be published. The treatment which our eminent inventor has received—more particularly in Prussia—if it were known, might occasion grave reflections in the minds of Englishmen as to how far they are justified in granting the protection of their Patent Laws to the subjects of a kingdom which shows so little regard for the inventive genius of their own. More than this I should not like to state. The finest specimens of Bessemer steel are exhibited in the Austrian department, and are from the Neuberg works.

In connexion with these splendid achievements it may be well to inform your Lordship what I have learnt from Mr. Bessemer respecting the introduction of his process into Austria. Mr. Bessemer informs me that the Government erected model works of his process, and invited the iron and steel manufacturers to inspect them, and to forward samples of their pig-iron, in order to have them tested as to their adaptability for the process. The success of the enterprise is complete, and the Austrians may congratulate themselves upon the brilliant prospect which it promises for the development of their iron industry.

There is one little thing, however, which they have omitted to do, and that is to reward the inventor for the great benefit he has conferred upon the empire. Possibly a knowledge of the history of the iron and steel manufactures in our own country may have afforded both Austria and Prussia a plea as well as a precedent for their injustice and ingratitude to British inventiveness.

It is unnecessary for me to say anything respecting the exhibition made by England in ceramics, as a unanimous verdict of approval has been given as to the manner in which our leading manufacturers have supported the reputation they had acquired at former exhibitions. As regards the British exhibition of ordnance, there must be many opinions as to the merits of our guns, but as regards the display there can be but one, and that is, that it redounds to the credit of the officials at the arsenal.

Before leaving the subject of the Exhibition, I would wish to state my conviction that it is most important that these International competitions should not be allowed to degenerate into a means for advertising; and it behoves those who are entrusted with the organization to see that the several departments of industry are entrusted to men who take an active interest in them, and are thus a guarantee that every endeavour will be made to have them fairly and properly represented, which is not the case on the present occasion, so far at least as refers to Classes 40 and 44.

In reference to the second part of Dr. Playfair's letter, recommending that an official inquiry should be made into the means "by which the great states are attaining an intellectual pre-eminence among the industrial classes, and how they are making this to bear on the rapid progress of their national industries," I would beg to observe that the sooner we are acquainted with the facts the better.

Whilst assenting to the proposition, I must distinctly state that I do not agree with Dr. Playfair that the technical education of working men is the most important method for the maintenance of our industrial supremacy. The information gleaned by acting upon his suggestion would be instructive, and great good would result from its application, but what is really wanted for this country, and is of vital consequence to our future prosperity, is a higher scientific culture of those who are likely, in the natural course of events, to be master manufacturers, so that when discoveries are made they may fructify and not stagnate or decay, as has too often been the case, for want of intelligence on the part of those who command capital and works to perceive their merits; and that they, the manufacturers, may be able to appreciate and adequately remunerate the scientific talent that this country is, and always will be, able to afford them.

I would add further, that no reformation bearing upon industrial progress is more required than in the legislature, and it is a reproach to the country that science is not represented in Parliament.

It is only a few years since that our classic and commercial statesmen repudiated the idea of the exhaustion of coal in England, whilst last year they, in a fit of alarm, organised a commission to inquire into its probable duration.

It would be well if an investigation were made as to what have been the results of the teachings in science of the German universities; what Liebig has done for modern chemistry, and how the system inaugurated by him at the small University of Giessen has spread throughout the world, and what benefits have resulted from it; what we owe to the teachings of other chemists, the physicists, metallurgists, and geologists of those excellent seats of learning. Whilst advocating the necessity for the dissemination of scientific training in England, I must not omit to bestow a passing tribute of commendation to the success of those institutions of recent date which were established to supply a want that existed many years since. I allude to the Royal College of Chemistry, of which the late Prince Consort was the president, the School of Mines, and the colleges in the metropolis where scientific departments have been founded. Of the two former I can speak from positive knowledge. In the first named, many of the men who have taught, and not a few of those who have studied there, have not only enriched chemical science by their researches, but have left a permanent mark upon the leading industries of this country. From the School of Mines have emanated men who in metallurgy and geology have greatly extended the application of those sciences, nor is this to be wondered at, when we consider the reputation of the professors under whom they have studied. It is, however, a well-known fact that the public do not rightly appreciate the education that this institution is capable of affording, and that comparatively but few of the sons of manufacturers avail themselves of its advantages.

Before concluding I would beg to call your Lordship's particular attention to a plan proposed by the eminent chemist, Professor Frémy, of the Institute. It is our most just and wise. He proposes that young chemists of talent, who are desirous of devoting their time to the advancement of science, and therefore for the benefit of mankind (and there are always many, not only willing but anxious to do so) should be liberally supported by the State. I quote the plan from memory, and can therefore only give the outline of his project. Permit me to suggest that your Lordship should bring this excellent idea to the notice of the noble and learned Chancellor of the University of London, who from his well-known zeal in the cause of education, and from his position, is better able than anyone else to obtain the evidence of scientific men as to its value, and, if approved of, to secure its adoption in this country. The same principle might be extended to the other departments of science which bear upon industrial progress.

In conclusion I must express my firm belief that extended scientific education is of the highest consequence to us if we wish to retain our present position in the scale of nations, that it will mostly benefit the future master manufacturer, that it must tend to elevate the social position of the intelligent working man, and to create a greater sympathy between master and man than at present prevails, and if it do this, the evils which threaten to impede, if not to paralyse, our national progress may be averted. I have, &c.,

David S. Price, Ph.D.

The Right Hon. Lord Taunton, &c., &c.

(*To be continued.*)

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, 1867.

The thirty-seventh meeting will be held at Dundee, and will commence on Wednesday, the 4th of September next, under the presidency of his Grace the Duke of Buccleuch and Queensbury, K.G.

The liberality of various public bodies has placed at the disposal of the Committee excellent and central accommodation for the sectional and other meetings; a large fund has been raised to defray the local expenses; the offers of private hospitality are numerous; special invitations have been given to a number of distinguished foreigners and corresponding members; and every effort will be made to receive and entertain visitors in the most cordial manner.

The reception-room at the Royal Exchange, Panmure-street, Dundee, will be open on Monday, September 2, at twelve o'clock, for the sale of tickets; and there every information will be given to visitors.

Members and Associates are received on the usual conditions.

The opening address will be delivered in the Kinnaird Hall on Wednesday, the 4th Sept., by the President.

Soirées will be held in the Volunteers' Hall, Parker-square, on the evenings of Thursday, the 5th, and Tuesday, the 10th of September. Evening lectures (by A. Herschel, Esq., on Shower-Meteors, and by A. Geikie, Esq., on the Geology of Scotland), will be delivered in the Kinnaird Hall, on Friday, the 6th, and on Monday, the 9th of September, at half-past eight o'clock.

Excursions have been arranged to take place on Saturday, the 7th, and Thursday, the 12th of September, to the Den of Airlie, Glamis Castle, Rossie Priory, Dura Den and Kilmaron, Newburgh and Errol Park, Balruddery, St. Andrews, Arbroath, Montrose, Falkland, and Loch Leven. Luncheon has been kindly offered to members of the association at the above places, by the following noblemen and gentlemen:—The Earl of Airlie, the Earl of Strathmore, Lord Kinnaird, Sir David Baxter, Bart., George Armistead, Esq., James Edward, Esq., the University of St. Andrews, the Provost and Corporation of Arbroath, the Provost and Magistrates of Montrose, and the Montrose Natural History and Antiquarian Society, and others. Other excursions are in course of arrangement, and special programmes of each excursion will be issued in the reception-room.

The Sections are arranged as follows:—

Section A. Mathematical and Physical Science, High School, Centre Hall.
„ B. Chemical Science, High School, Mathematical Class-room.
„ C. Geology, Panmure-street Chapel.
„ D. Biology, High School, School of Art.
„ E. Geography and Ethnology, Albert Institute.
„ F. Economic Science and Statistics, Euclid-street Chapel.
„ G. Mechanical Science, Watt Hall, Constitution-road.

The principal railway companies have consented to convey members and associates at a reduced fare for the double journey. To secure this privilege an early application must be made to the local secretaries, 21, Reform-street, Dundee, for pass-tickets.

Tourists' tickets are issued from London to Dundee, available for return within one month, Fares—1st class, 138s.; 2nd class, 102s.; 3rd class, 56s. each.

METEOROGRAPH AT THE PARIS EXHIBITION.

One of the most interesting objects in the Exhibition is the meteorograph, invented and exhibited by the Director of the Observatory at Rome, Father Secchi, and for which he has obtained the "Grand Prix." This apparatus is perfectly self-acting, and registers, in the form of a diagram, the changes of the atmosphere as they take place. On each side there is a board, covered with paper, moving vertically in a frame from top to bottom by means of clockwork. On one is registered, for two days and a-half, the indications of the barometer, psychrometer, and the hour and currents of rainfall. On the other board, which completes its course in ten days, the indications of the force of the wind, its direction, the metallic thermometer, the height of the barometer, and the hour of rainfall, are likewise repeated.

The barometer tube is of wrought iron, bored out perfectly cylindrical. The upper part, forming the barometric chamber, is 2·36 inches in diameter, and the tube is 0·69 inches in diameter. This tube floats freely on the top of the mercury, and a great part of its weight is supported by a wooden collar driven on the lower part. The top is attached to one end of a lever, with a counter-weight at the other end; another lever is fixed to near the lower end, so as to keep it always in a vertical position. At each end of the suspending axis is a parallel motion, for carrying the pencil for tracing the diagram in a straight line on the two boards.

The psychrometer, or wet and dry bulb thermometer, for the purpose of determining the quantity of moisture in the air, is registered in the following ingenious manner:—A platinum wire passes through the glass at the bottom of the bulbs, so as to put the mercury in connection with a galvanic battery. The tops of the tubes are open, to allow of two other platinum wires, fixed in a frame, being, at a given moment, plunged into them, and when lowered to the level of the mercury an electrical current is established in the apparatus for holding the pencil to register the temperature and press it against the paper.

A small carriage, carrying the pencil, on which is fixed a Morse instrument, is made to traverse in front of the paper every quarter of an hour. This movement is produced by the striking part of the clock, an eccentric being fixed on the wheel making one revolution each quarter of an hour. This eccentric moves a large triangular-shaped lever; to this level is attached one end of a steel wire, the other end of which is attached to the frame on which are fixed the platinum wires at the top of the wires. In this manner the movements of the carriage and the frame are simultaneous, only the length of traverse of the carriage is greater than that of the frame, it being connected with a point on the lever further from the fulcrum. Thus, when the carriage begins to move, the frame is lowered.

The moment the platinum wire touches the surface of the mercury in the dry bulb thermometer a current is established in the electro-magnet on the carriage, and the armature at the end of a lever is attracted towards it, whilst the other end, carrying a pencil, is pressed against the paper, and marks a point representing the height of the thermometer. The carriage travels on till the second platinum wire comes in contact with the mercury in the wet bulb thermometer; an electric current is established; an apparatus above the carriage breaks the current in the electro-magnet, and the pencil is removed from the paper. In returning, the carriage reproduces the breaking and opening circuit, only in the reverse manner, and another point is obtained, which indicates the end of the line. Thus a double row of points is obtained, arranged on two curved lines, one of which represents the height of the dry bulb, whilst the other represents the wet.

The simultaneous motion of the carriage and frame is established simply by means of a steel wire, and is sufficient for the short distance between the psychrometer and the machine; in some cases, where they are some distance apart, clockwork is used, and cams, as an interruption of circuit, are attached to the clock.

The time of rainfall is marked on the same paper by means of a lever carrying a pencil moved by electricity. The movement of the electro-magnet is produced by a small water-wheel placed under the gutter in a convenient part of the building, and which by revolving opens and closes the circuit of the battery.

The quantity of rain is measured in a reservoir placed at the bottom of the apparatus. The rain-water collected in a funnel placed on the roof passes, by means of a tube, to the reservoir, and raises a float carrying a rod with a pointer, which marks on a graduated scale. At the end of this rod is attached a small chain, which passes over a small pulley furnished with a disc of paper; the rotation of the pulley is in proportion to the quantity of rain. The pencil, fixed on a support, moves along the radius of the disc at the rate of about 0·20 inches per day, and in this manner the quantity of rain is marked each day on the wheel at a different place.

The reservoir is 7·48 inches in diameter, whilst that of the funnel is 14·96 inches, or four times the area; thus the height marked on the scale is four times that of the actual fall.

The direction of the wind is registered by four telegraphs. At the foot of the weather-cock is placed a circle with four metallic sectors, covered with platinum, against which a small projection on the axis is pressed.

The apparatus is provided with four telegraphs, the electro-magnets of which are respectively in communication with the four sectors; each of these four telegraphs, by vibrating its lever according to the direction of the weathercock, connects the circuit, and gives one of the four cardinal points. The register of intermediate winds is obtained by the combination of the two neighbouring ones. A vibration of the rod to which the pencil is fixed is produced by each revolution of the vane, for measuring the velocity of the wind.

The velocity of the wind is measured by the anemometer invented by Dr. Robinson, which consists essentially of four hemispherical cups, having their diametral planes exposed to a passing current of air; they are placed at the end of four horizontal arms, attached to a vertical shaft or axis, which is caused to rotate by the velocity of the wind. On this shaft an eccentric is fixed, by means of which a succession of currents in opposite directions is produced. The apparatus is provided with three counters, which are put in motion by the electrical current, which passes by the middle counter, whatever may be the direction of the wind, and at each revolution of the vane the escapement wheel of the counter is advanced one tooth by means of the electric current. This counter gives the number of revolutions of the vane; this is reduced into kilomètres on the second dial of the counter. The velocity of the wind each hour is noted on the diagram, fixed by means of a chain, which is wound more or less, according to the strength of the wind, on a pulley. This chain is connected with a parallel motion, to which is fixed a pencil. This pencil, drawn by the chain, traces a line more or less long, corresponding with the length of chain wound on the pulley. This pulley is thrown out of gear every hour by means of an eccentric fixed on the striking part of the clock, and by means of a counter weight the chain is unwound, and the pencil makes its mark on the paper.

The metallic thermometer consists of a copper rod, the expansion and contraction of which act on a lever, which communicates with a pencil for tracing the curve corresponding with the variations of temperature on the paper. This rod is 52ft. 6in. in length.

An apparatus on the same principle has been at work for the last seven years at the Observatory at Rome, with most satisfactory results, and an atlas of diagrams registered by it is exhibited.

The galvanic battery used is a modification of the Daniell battery, with sand.

The clock and wheel-work of the counters were made by M. Détouche, of Paris; the other parts by M. Eren-Brassart, of Rome. The wood-work is by M. Pietrocola, of Rome. The barometer tube, which is a forging requiring great care, made like a gun-barrel, was constructed in the workshop of M. Mazzocchi, gunsmith, of Rome.

Fine Arts.

International Architectural Congress at Paris.—The Imperial Central Society of Architects of France have initiated a series of conferences, the first of which took place a few days since. M. Baltard, Member of the Institute of France and President of the Central Society, opened the proceedings with a complimentary reference to the attendance of foreign architects, and invited discussion on all points raised. The first question brought before the meeting was, "What, in an æsthetic and philosophical point of view, is the actual condition of architecture amongst modern nations, and what are its tendencies?" M. A. Hermant opened the question, arguing that the tendencies of the age were eminently scientific and industrial, and that such tendencies had produced an almost universal eclecticism, which had become the dominant characteristic of the architecture of the 19th century; and that industry inevitably tended to raise the useful above the beautiful, which was an unfavourable condition for the manifestation of art. At a second meeting, held some days later, the question was discussed, the conference generally adopting M. Hermant's view. The second question, opened by the president, M. Baltard, was, "What are the methods of education at present in use?" M. Baltard showed that in old times young architects were trained by masters with whom they were in close and intimate relation, and that afterwards such training was completed by special courses of study and competitions in public schools. The president strongly advocated the development of artistic study. M. Boeckmann, of Berlin, explained in outline the system adopted in his country, and mentioned the special fact that no distinction was made there between architecture and civil engineering. The third subject of discussion was, "The position of the architect in society, taken from a professional point of view;" and the fourth, "The influence of architecture on the productions of industry." The conferences were altogether four in number, and there was a generally-expressed hope that the architects of various nations should come into more frequent communication. Several Prussians, a Russian, and a Portuguese architect present took part in the proceedings, but no English name appears.

Encouragement to Art in France.—Madame Troyon, mother of the late admirable artist, has offered the Academy of the Beaux Arts of Paris to establish an annual prize of 600 francs, or a biennial one of twice the amount, to be called the "Prix Constant Troyon," for the assistance and encouragement of French artists whose age shall not exceed thirty years. The academy has accepted Madame Troyon's offer.

Commerce.

The State of Egypt.—The following is extracted from the report of Mr. Consul Stanley, on the trade and commerce of the port of Alexandria for the year 1866:—"The development of the railways, and the introduction of steam power for irrigation and cotton gins and presses, have added largely to the coal required for the country; and the wealth of the people, consequent on the profits derived from the cultivation of cotton, has largely contributed to the general use of British manufactured goods amongst the rural population. These two items are almost wholly carried in British ships; and, in 1862, when cotton was first planted, to the almost total exclusion of cereals, the increase in the number of British vessels over the preceding year was extraordinary. This increase has been since fully maintained. The year opened with good prospects for cotton, the price here for 'Fair' being 23½d. on the 1st of January, and the quantity shipped in the first three months reaching 71,500 bales, of which upwards of 33,000 left in the month of March. News then arrived

of large shipments from America. This, combined especially with the monetary panic in England, greatly reduced its value, which, in November, fell to 15d., a difference of 9d. from the highest rate of the year, namely, 24d. at the end of March. The new crop first appearing for shipment in October will show a large diminution, both in quantity and quality, compared to what was at first anticipated. The value of the shipments in 1866 was less than half the value of the shipments in 1865, namely, quantity sent to England, 946,000 cantars, valued at £5,825,000; to other countries, 207,000 cantars, valued at £1,271,500; making a total of 209,000 bales, valued at £7,096,500, in 1866; against £15,839,100 in 1865. Cotton seed naturally shows the same diminution, both as to quantity and quality, as its produce; but large rates have been obtained, in consequence of its scarcity here, and the increased demand for it in England. The present condition of the agricultural industry of Egypt has been so entirely diverted from the rotation of crops in its normal state, that any person now going through the country to take a view of the produce of the soil would be altogether misled. The enormous profits which were realised by the growth of cotton during the American war have caused this. When the Cotton Supply Association sent a memorial to the late Viceroy, Said Pasha, praying his Highness to use every possible effort to encourage the cultivation of cotton, the reply was characteristic, and evinced a correct impression, and almost a prophetic dread of the revolution that would be produced by an immoderately enhanced price for cotton. He said, 'Prices alone will prove a sufficient stimulus without any effort on my part; but God forbid that I should ever see the abandonment of the ordinary succession of crops for the production of cotton, to the exclusion of those products on which we subsist.' Within a short period from that time Egypt, which had ever been a large exporter of grain, of beans, &c., had to seek food from other countries, and became an extensive importer; grain was considerably dearer in the interior than at Alexandria; in some places absolute famine ensued. An undesirable change was wrought, the recovery from which will be as slow as its accomplishment was rapid. The value of land was quadrupled; wages rose in an equal ratio; labourers earned so easily sufficient for their wants that they became indolent; an excessive luxury sprung up, and that not of a nature to benefit the commercial world, being displayed in a demand for white slave girls, costly pipes, and other such appliances, which do not much benefit the industrious world without. Meanwhile the land, from the constant crops of cotton in succession, has become impoverished. Cotton, however, has long been, and must continue to be, the most important production of Egypt. It is sown in March or April, and arrives at maturity in August or September. An average yield in good summers is 300lb. to the acre; the New Orleans variety has been found to yield 800lb. per acre; but it is found unmarketable, and is therefore little cultivated. Cotton seed has also become an important source of profit. In 1858 the ardeb of 270lb. sold for 25 tarif piasters, now it sells from 65 to 75 piasters. Formerly it was not of sufficient value to justify its being sent to Alexandria, and it was used as fuel. Now it is all shipped to Europe, and from it is pressed an excellent oil, and from the refuse a cake is made which is said to be more nutritious than linseed cake."

The Supply of Guano.—At the recent meeting of the Highland Agricultural Society at Glasgow, Professor Anderson referred in a lecture to the complete exhaustion of guano from the most northern of the Chincha Islands, and to the inferior quality of guano now obtained from the southern island. The farmer buys for his money a smaller quantity of fertilizing matter than he formerly did; the effect, however, will scarcely be felt in the first crop, but must ultimately tell to disadvantage from the deficiency of residual fertilizing matter left in the soil. As the demand for real Peruvian guano is not increasing, there is a fair prospect of its lasting for a generation to come, but at the end of that time the supply of nitrogenous manures must become a very grave question, seeing that the ammonia contained in the Peruvian guano annually imported is equivalent to about 120,000 tons of sulphate of ammonia, greatly exceeding the quantity of that substance at present derived from all other sources put together. Hope lies in the increased manufacture of ammonia in gas works and in various processes of the arts, and also in the gradual reproduction of natural guano—of which we have an instance in the renewed supply from Ichaboe, an island exhausted about 30 years ago. The lecturer showed how analysis and the system adopted by importers have checked and almost destroyed the practice of adulteration; he then noted the improvement in quality and the diminution in price which have been latterly found in superphosphates, due in great part to the introduction of bone ash and mineral phosphates. Dissolved bones may be said to no longer exist: we now get a mixture of these with bone ash or mineral phosphate; and, by an improvement in the process of manufacture, the manure is much more finely reduced, and more convenient for application than it used to be. So far as the supply of phosphates is concerned, Professor Anderson feels no anxiety, new mines of these substances being continually discovered, and often in the most unexpected geological formations.

Colonies.

Natal Horses for India.—The following is extracted from the *Natal Mercury*:—"Horse-breeding is represented by those farmers that pursue it as being about as satisfactory and profitable an occupation as any in Natal. Of course certain conditions are requisite. Pasturage and locality must be adapted to the pursuit; but there is said to be no lack of either in the midlands and upper districts of this colony. Horses are so much more valuable than cattle or sheep, that greater care can be devoted to the charge of a small number. They can be more tenderly handled, and more completely guarded from the inclemencies of the climate. Horses have multiplied marvellously during the last few years. Fifteen years ago it was a rare phenomenon to see a Natal kafir mounted. Now, few things are more common. The streets of Maritzburg are pervaded by half-dressed savages bestriding weedy, but often sturdy little nags. On the lands lying nearer the Drakensberg most of the kafirs have horses; and some of the chiefs in Weenen and Klip River counties can turn out a regiment of mounted followers. The blue-book returns also show how fast the stock of horses in Natal has increased in numbers. So numerous are horses getting that the breeders find it difficult to get a market for them. Hence their anxiety at this time to open up India as an outlet for sale. Major Erskine and Col. Pennefather have severally initiated the movement, and the farmers have jointly taken it up. They say they are quite ready to supply horses according to the prescribed conditions, but as regards shipment and disposal, these being commercial matters, they leave business men to undertake that part of the work. A correspondent, who proposes himself to be a seller, says that the farmers can and will find the horses, and supply the food, and further, they agree to let all expenses incurred be a first charge upon the proceeds of sales. Consequently, the shippers will run no risk—unless, indeed, the horses are lost on the way. This proposal, therefore, deserves to be considered by some of our merchantmen, who are so often complaining of the want of exportable commodities. The commercial community is bound to co-operate with the producing classes in such a movement. Nor ought they to be supine. By good luck Natal has won the favour of the Indian government as regards horse supply, in

the teeth of the prior claims and older reputation of the Cape Colony. In the latter, public attention is again being directed to the project, and the fact that Natal has stepped in and anticipated her elder sister, is cited to the discredit of the latter. It will be yet more to our discredit if, having won the preference, we lose it, or fail to make good use of it. Australia is as alive as the Cape now is to the advantages presented by India as a market for horses. But there is another reason why prompt action is expedient. The Persian authorities have just removed certain restrictions from the sale or exportation of horses, and the Arabian ports are open for the shipment of the fine animals for which the Indian service was formerly renowned. Our last Bombay papers make much of this fact, and it may possibly affect in some degree the readiness of the government to purchase Natal horses. Madras, however, is open to us as well as Bombay, and the success of Captain Linthorne's speculation gives fair encouragement for a repetition of the venture. To succeed in this movement, our breeders will of course have to aim at excellence in blood and quality. They know what stamp of horse is needed. They know that they can rear it. It will be for them to effect yet further improvement, and make a study of what may hitherto have been more a pastime than aught else. The rearing, training, and perfecting of so noble a creature as the horse, is an employment worthy of any man's powers, and if a fair sale be ensured for the results of labour, we may expect to find this branch of enterprise extensively followed. Since penning the above the Howick resolutions have reached us, and we are glad to find that matters are so far matured by our enterprising breeders, and that no more time will be lost.

The Grass Tree.—A correspondent of the *Melbourne Argus* speaks of having seen a sample of a square-headed broom, made from the colonial grass-tree, and produced by machinery, which will turn out the article in any quantity that may be desired. It appears to be admirably adapted (says the writer) for the general purposes of a household broom, and has been already brought into extensive use in some localities. The broom has been used by puddlers for sweeping out their machines, and this severe test speaks well for the durability of the new industry.

Mining in South Australia.—The great question of the day is the peculiar position of the mining interest. The renowned Burra Burra mines, which have added four millions sterling to the exports of South Australia, are closed, and the whole of the newly-developed mining interest in Yorke's peninsula (where more than 10,000 people live exclusively dependent on the mines) is threatened with sudden extinction by the stoppage of the hitherto prolific Moonta mines, consequent on an injunction granted by the Supreme Court, prohibiting a distribution of profits, causing the withdrawal of all accommodation by the bankers of the mine.

Gold in New South Wales.—The diggers everywhere are doing well, and the yield of gold during the month is in excess of that of last month. At Emu Creek a gold reef has been struck at some distance from the old workings, and gold obtained in more remunerative quantities than ever. There is but one crushing machine on the ground, and that is of very inferior construction.

Sugar in Queensland.—A letter from Mr. Walter Hill, curator of the Botanical Gardens at Brisbane, which has appeared in a colonial paper, says:—"The several experiments made in the cultivation of the sugar cane in Queensland during the last two or three years have sufficiently proved the practicability of the enterprise, and fully justified the hope that, ere long, the youngest of the Australian group will creditably compete with England's most favoured East and West Indian possessions in the cultivation and export of sugar. The question as to the capability of the colony to grow the sugar cane having been decided in the affirmative, the next—if not the only important—question to be inquired into is the nature of the soil best adapted to the growth of the sugar cane in Queensland, and the varieties of the cane which are likely to admit of the most profitable cultivation. It is true the experiments already made are comparatively very few in number, and it may even be doubted whether the varieties inherently best adapted to the peculiarities of the Queensland climate have been tried at all. My experience, however, so far as it goes, embraces several very highly esteemed varieties of cane, which, in the West Indies and elsewhere, are regarded as the chief staples of the sugar-trade, and in nearly every instance the experiment has been eminently successful. The first, and hitherto perhaps the most important sugar plantation established in Queensland climates, is that of the Hon. Louis Hope, at Cleveland. If I remember rightly, it has been in existence about three years, and during that period it has produced some fine crops of various descriptions of sugar-cane, including the varieties known as the Bourbon, Otahetean, the Ribbon, and Batavian, which are looked upon in all other parts of the globe as by far the most prolific and valuable in their secretion of saccharine matter. The soil in this plantation is slightly elevated, and of a dark-reddish chocolate colour, with a little admixture of volcanic *débris*, and characterised more by dryness than moisture. When properly prepared, this soil is adapted to all kinds of sugar cultivation, but most particularly to the growth of those canes known as short-jointed and swollen stemmed; which in comparison with the elongated jointed, generally contain a much greater density of juice, or larger proportion of saccharine matter. Among those which seem to flourish best are the purple violet, or large black cane of Java, and the Diard rose cane, both short-jointed. Of the elongated, as next in rank, may be mentioned the white or yellow cane of the Mauritius, or Bourbon cane, and the Guingham or ribbon cane of Batavia. The next plantation in the order of time is Messrs. Raff and Co.'s, at the Caboolture river, comprising about 130 acres under cultivation. The soil here is a very moist black alluvial, of considerable depth and richness, and the elongated canes, in consequence, attain a most exuberant growth. Many of them reach a height of from fifteen to twenty feet in eleven months, and, although this may be taken as a general indication of success in the cultivation, it is by no means a favourable criterion of the density of the juice or richness of the saccharine secretion. The more excessive the woody growth in height, the thinner generally is the juice. These, as well as the short-jointed canes, however, possess one very important advantage, in the fact that their stoles (the stumps or roots whence the plant cane, or original, was cut) throw up suckers or ratoons in larger numbers; and, singular to say, the experiments at Cleveland prove that the ratoons in the short space of nine months attained a greater density of juice than the original canes did in sixteen or eighteen months, thus showing that the young ones are the medium of sudden and progressive improvements. It may be mentioned that all the varieties of canes planted at the Caboolture, although not nearly so numerous as those grown in some other parts, have thriven exceedingly well. Several other plantations have also been started within the last eighteen months, among which may be mentioned one at Pimpama, one at the Albert, one at the Caboolture, several at Maryborough, two at the Pioneer, one at Port Denison, and one at Rockingham Bay, in all of which cases the progress of cultivation is extremely encouraging, and suggestive of the most brilliant hopes for the future. From the facts already developed by experience, one thing seems very certain, namely, that the whole belt of land along the sea-coast from one end of the colony to the other is pre-eminently suited for sugar cultivation."

Queensland Cotton.—The quantity of cotton raised in

Queensland during the past three seasons is as follows :—In 1864, 28,730lbs.; in 1865, 145,820lbs.; first ten months of 1866, 183,630lbs. A much larger area of ground is under cultivation for the season of 1867. Forty bales of cotton, the first picking of this season, has already been sent to Brisbane from the Townsville cotton plantation, one of the largest in the colony, situated about forty miles from Brisbane. It is estimated that the yield from this plantation alone will be about 670 bales.

The Intercolonial Exhibition at Melbourne.—Much interest has been taken in this Exhibition. The number of season ticket-holders was 4,244, who visited the Exhibition 92,331 times. The amount received for the tickets was £3,004 15s. The number of gratuitous passes issued was 15,038 to exhibitors. The number of payers at the door was 124,175, paying £6,829 15s., making, with the season-tickets, £9,834 10s. The number of visits paid amounted in all to 252,404, out of a population of about 650,000.

Provisions in Victoria.—Grain and every kind of agricultural produce are very abundant, and prices are consequently low. Wheat averages about 40s. per quarter, and at that price shippers are still buying for England. In some parts of the colony wheat is worth no more than 24s. per quarter, owing to the distance from market. Bread is now cheap everywhere. A company of stockowners has been formed at Riverina, for the purpose of erecting an establishment at Hay, capable of boiling down 10,000 sheep weekly. Formerly there was more fat beef in the colony than could be consumed, but the number of cattle in Victoria has been decreasing for some years past, sheep having been found more profitable, so that Victoria is now partly dependent on the neighbouring colonies for the supply of beef; therefore no cattle will be boiled down, nor will the colony be able to enter largely into any project for preserving and exporting meat.

Notes.

The Proposed Co-operative Congress in Paris.—The authorities have refused permission for the meeting of the International Co-operative Congress proposed to be held in Paris this year, at the suggestion of the Société du Crédit au Travail.

Aeronautical Experiments.—So many extraordinary attempts have been made to control balloons, and generally with such lamentable results, that anything new in the way of aeronautical experiments mostly calls forth a smile. Still, when a man of acknowledged ability takes up the subject seriously his efforts deserve attention, and such seems to be the case with M. Henry Giffard, the inventor of the famous steam injector. It appears that in 1852 this gentleman made an ascent within the Hippodrome, seated on the tender of a small steam-engine, suspended to a cylindrical balloon. Preparations are now being made by the same gentleman for raising a balloon of sufficient size to carry a number of persons, principally with the view to scientific experiments. M. Giffard proposes to make his balloon captive during these experiments, and for this purpose he has provided a cable 300 mètres long, and weighing a ton. The plan adopted by M. Giffard is not made known, but the importance of the experiment may be indicated by the fact that two steam-engines, of about 20-horse power each, form a part of the material prepared. The experiments are to take place within a large circular enclosure, which may be seen from the gate of the Exhibition in the Avenue Suffren.

The Public Gardens of Paris.—There are in Paris, besides the parks, twelve gardens thrown open to the public; and the following are the particulars of their size and the cost of their formation :—The Garden (or *Square*, to adopt the Paris name) of the Tower of Saint Jacques measures 5,785 square mètres, and cost 141,700f. The Square des Innocents, which contains the fountain decorated with the nymphs of Jean Goujon, measures 1,957 mètres, and cost 201,580f., which includes, evidently, the restoration of the fountain. The Square of the Temple measures 7,524 mètres, and the cost was 148,580f. The Square Vintrinille, the first formed in Paris, was purchased by the authorities several years since, and was transformed at a cost of 13,500f.; this square is only 778 mètres in extent. The Square Sainte Clotilde, in front of the church of that name, measures 1,733 mètres, and its construction cost 32,229f. The Square Louvois, in the Rue Richelieu, covers 1,776 mètres, and the expense of its transformation was 56,000f. The square recently formed about the expiatory chapel of Louis XVI. and Marie Antoinette is 6,165 mètres in extent, and cost 183,000f. The Square of Belleville measures 12,100 mètres, and the expense of its transformation was 20,000f. The Square Montholon measures 4,300 mètres, and cost 185,000f. That of Montrouge, 7,100 mètres, cost 101,500f. That of the Arts-et-Mètiers, in the Rue Saint Martin, 4,112 mètres, cost 320,000f. The largest of the new squares, or gardens, is that of Batignolles; it measures 15,000 mètres, and the laying out cost 155,000f. The whole of these gardens form, together, open spaces in the centre of the city measuring about seventeen acres, and the whole expense of their establishment, or conversion, amounts to about £63,000.

Abolition of Imprisonment for Debt in France.—The French legislature has totally abolished imprisonment for debt; and the other day the doors of the debtors' prison at Clichy, in Paris, were thrown open, and the same was of course done in the provinces. The number of persons confined at Clichy amounted to little more than sixty.

The Director of the Paris Mint.—M. Dumas, chemist and senator, has been appointed to succeed the late M. Pelouze, as director of the *Commission des Monnaies* of Paris. M. Dumas had previously resigned his appointment of professor in the faculty of science in the University of Paris, and inspector-general of the high schools of France.

Safety for Railway Travellers.—It is said, on the authority of a French journal, that it has been determined to enforce the establishment of a foot-board, provided with a hand-rail, along the whole length of every train, in order that conductors, as well as passengers, may have the means of escaping from the attacks of malefactors or danger from fire; such a plan has been partly carried out on the northern and southern railways of France.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 1st August, 1867.

292. Bill—Railways (Scotland) (Lords' Amendments).
405. (1.) Mail Services (India and Australia)—Correspondence.
454. Navy (Dockyard Stock Valuation and Expenditure on Ships, &c.—Return.
455. Navy (Dockyards and Steam Factories)—Return.
471. Fire Protection—Report from the Select Committee.
481. East India (Bengal and Orissa Famine)—Despatch.

Delivered on 2nd August, 1867.

404. Statute Law Commission—Accounts (corrected copy).
433. Paris Exhibition—Report and Evidence.
442. Coinage—Account.
462. Educational Service (Bombay)—Correspondence.
British Columbia and Vancouver Island—Further Papers.
Jamaica—Further Papers.
Public General Acts—Caps. 36 to 57.

Delivered on 3rd August, 1867.

294. Bill—Quinagh and Parsonstown Drainage.
295. ,, Local Government Supplemental (No. 5) (Lords' Amendments).
475. Distillers, &c.—Return.
480. Navy (Iron Ballast)—Letter.
482. Army (System of Retirement)—Report from the Select Committee.
483. Court of Session, &c. (Scotland)—Return.

488. Parliamentary Boroughs—Return.
493. Tenements (Roscommon)—Returns.
Jews (Moldavia)—Further Correspondence.
Public General Act—Cap. 58.

Delivered on 5th August, 1867.

296. Bill—Recovery of certain Debts (Scotland) (amended).
297. ,, Trusts (Scotland) (amended).
298. ,, Railways (Ireland).
473. (I.) National Education (Ireland) (Denominational System)—Answers.
467. Poor Rates (Scotland) and Parliamentary Burghs (Scotland)—Returns.
484. Valuation (Ireland)—Returns.
489. Refreshment Houses—Return.
494. Merton College (Correspondence).
501. Poor Law Unions (Valuation Lists)—Returns.
Public Petitions—Thirty-sixth Report.

Delivered on 6th August, 1867.

491. Wexford Harbour—Returns.
495. Metropolis Subways Bill—Minutes of Evidence, &c.
502. Army Prize Money—Account.
503. Ecclesiastical Titles and Roman Catholic Relief Acts—Report from the Select Committee.
Abyssinian Captives—Further Correspondence.
Public General Acts—Cap. 59 to 69.

Session 1866.

422. (B I.) Poor Rates and Pauperism—Return (B).

Delivered on 7th August, 1867.

286. Bill—Clerk to Justices in Counties.
299. ,, Merchant Shipping (amended).
300. ,, Naval Knights of Windsor.
301. ,, Representation of the People (Lords' Amendments).
302. ,, Railway Companies' (Ireland) Advances.
431. (A 1) Poor Rates and Pauperism—Return (A), May 1866 and 1867.
456. County Treasurers, &c. (Ireland)—Abstract of Return.
499. Chamber of London—Annual Accounts.

Delivered on 8th August, 1867.

293. Bill—Metropolitan Buildings and Management.
304. ,, Companies Act (1862) Amendment (amended).
305. ,, Railway Companies (Lords' Amendments).
306. ,, Railway Companies (Scotland).
313. (I.) East India (Police Force)—General Statement.
496. Mines—Report from the Select Committee.
504. Professor Thompson's Letters—Correspondence.
511. Parliamentary Deposits—Second Report from the Select Committee.
Poor Law—Nineteenth Annual Report.

Delivered on 9th August, 1867.

307. Bill—Increase of the Episcopate (amended).

Delivered on 10th August, 1867.

430. New Forest—Returns.

Delivered on 12th August, 1867.

309. Bill—Courts of Law Officers (Ireland) (Lords' Amendments).
310. ,, Agricultural Gangs.
311. ,, Courts of Referees.
105. (I.) East India (Irrigation)—Despatches.
479. Naval Prize Money, &c.—Account.
503. Ecclesiastical Titles and Roman Catholic Relief Acts—Report and Evidence.
512. Battersea Park—Return.
513. Police (St. Marylebone)—Return.

Patents.

From Commissioners of Patents' Journal, August 9th.

Grants of Provisional Protection.

Aërial locomotion—2149—R. Lakin.
Agricultural implements—2176—T. Reid.
Agricultural implements—2181—A. Jack.
Air engines—924—P. Shaw.
Bed bottoms, spring—2145—S. Bonsall.
Brewing apparatus—2137—W. E. Newton.
Brick-making machines—1922—W. Steven and A. Robertson.
Bricks, tiles, &c.—2158—C. H. Murray.
Cartridge cases—2167—C. E. Brooman.
Cartridges—2172—G. B. Northcote.
Cast steel, &c.—2166—C. E. Brooman.
Chairs, reclining—2171—R. Reid and E. H. Craigie.
Clasps for pocket-books, purses, &c.—2197—A. Holloway.
Clothes' lines, apparatus for supporting—2187—A. Macfie.
Coke, manufacturing—2152—H. Aitken.
Cooking apparatus—2110—G. T. Bousfield.
Cranes—2193—P. G. B. Westmacott.
Door, &c., fastenings—2116—J. Rogers.
Entrenching tools—2120—K. H. Cornish.
Fire, apparatus for saving life and property from—2083—H. G. Dunn.
Fire-arms, breech-loading—2091—T. W. Riddell-Webster.
Fire-arms, breech-loading—2153—R. B. Roden.
Fire-arms, breech-loading, and cartridges—2168—G. L. Barens and J. F. Ladougne.
Flax, treating—2104—N. J. O. Stubber.
Gas, manufacturing—2180—P. A. Rohart.
Gas regulators—2173—E. Smith.
Horticultural buildings, &c.—2150—W. Simpson and W. Howitt.
Ingots, casting—2161—A. Wilson.
Iron, manufacture and treatment of certain kinds of—2185—J. Wood.
Iron, manufacturing—2189—T. Greener and W. Ellis.
Iron, preserving—2142—H. A. Dufrené.
Lace, &c., transferring devices in—2136—H. S. Sakünlünski.
Lamps—2186—E. Ravenscroft.
Letter boxes, &c.—2141—W. Dennis.
Lightning conductors—1127—T. W. Gray.
Locks and latches—2184—T. Jones.
Looms—2138—D. Welsh.
Milling tools and circular cutters—1956—P. F. Tranchat.
Mineral oils, distilling, &c.—2175—E. A. Rippingille.
Nets and netting—2140—J. H. Johnson.
Peas, crushing, &c.—2127—A. Sezille.
Photographic negatives, &c., preparing canvas for enlarging and printing—1994—J. M. Loere.
Pipes and tubes—2159—C. T. Moulan.
Ploughs—2088—T. Pirie.
Ploughs—2160—W. E. Newton.
Rags, treating fibres from—2163—W. Wood.
Railway points and signals—2143—W. Easterbrook.
Railway trains, communication between passengers, guards, and drivers of—2156—S. Turton and G. Holcroft.
Railways—1170—J. B. Mannix.
Reaping and mowing machines—2162—J. Brown and W. Lillie.
Reciprocating motion—2155—A. M. Clark.
Rice, &c., hulling—2191—W. R. Lake.
Rollers, elastic—2174—J. Smith and W. Schofield.
Salts, &c., treating certain—1556—I. Baggs and F. Braby.
Ships' compasses—2183—G. Franklin.
Ships' signals—2165—T. M. Almond.
Steam engines—2169—J. Edge.
Steam vessels, constructing and propelling—2178—E. T. Hughes.
Studs, buttons, &c.—2195—J. H. Wyatt.
Tanning machinery—2146—S. Bonsall.
Telegraphs—2147—Sir W. Thomson.
Telegraphs—2192—G. Davies.
Tenons, machinery for cutting—2148—W. Geeves.
Type, composing and distributing—2164—A. Mackie.
Vehicles, wheeled—1976—W. R. Gorst.
Ventilators—2125—W. Taylor.
Vessels for the reception of waste matters—1710—H. A. Bonneville.
Water and gas meters—2179—W. E. Newton.

Inventions with Complete Specifications Filed.

Boilers—2235—B. Harlow.
Feathers—2247—C. Touaillon.
Fire-arms, breech-loading—2227—W. R. Lake.
Pocket knives—2226—W. R. Lake.
Weavers' harness, manufacturing—2214—W. R. Lake.

Patents Sealed.

387. E. Manico.	441. A. Dillon.
389. E. H. Bernier.	455. M. Cavanagh.
390. J. B. Booth.	539. H. A. Bonneville.
397. H. H. Grierson and J. McElroy.	675. J. G. Tongue.
402. W. E. Gedge.	750. W. E. Newton.
406. W. Jones.	882. W. E. Newton.
408. S. Osborne.	1256. W. Snell.
411. J. Walton and R. Harlow.	1566. W. Snell.
414. J. V. Toepken.	1590. J. R. Cooper.
419. R. George.	1686. H. Parker.
435. J. Parkes.	1764. W. R. Lake.

From Commissioners of Patents' Journal, August 13th.

Patents Sealed.

416. D. Tenniswood.	473. J. M. Kaufmann.
420. J. P. Kerr and W. McGee.	479. W. Hale.
427. T. W. Nicholson.	482. J. R. Crompton.
432. J. Carter.	492. W. Clark.
436. E. Stevens.	497. J. P. Smith.
437. E. Stevens.	525. G. Young.
438. R. Hodson.	610. F. H. Jones.
439. W. Hill and H. C. Wilberforce.	673. W. S. Lowe.
	776. F. H. Wenham.
442. W. H. Harfield.	1221. J. Cariss.
444. C. Wenner.	1440. A. V. Newton.
452. H. Y. D. Scott.	1864. W. R. Lake.

Patents on which the Stamp Duty of £50 has been Paid.

1959. R. Edmondson.	2046. G. Coles, J. A. Jaques, and J. A. Fanshawe.
1963. N. McHaffie.	
2337. H. Vale.	1988. H. Armistead.
1998. A. B. Childs.	2003. J. Adam, J. Webb, and J. J. Monteiro.
2006. W. Brenton.	
2025. A. C. Pilliner & J. C. Hill.	2050. J. J. Parkes.
2010. G. Davies.	

Journal of the Society of Arts.

FRIDAY, AUGUST 23, 1867.

Announcements by the Council.

Artizans' Visit to Paris.

Her Majesty's Government have granted to the Society of Arts, in aid of the fund now being raised by the Society for assisting workmen, specially selected from various trades, to visit and report on the Paris Exhibition, the sum of £500, conditional on the Society raising a like amount by public subscription.

The following is the list of subscriptions up to the present date :—

H.R.H. the Prince of Wales, President	£31	10	0
Her Majesty's Government (conditional)	500	0	0
Society of Arts	105	0	0
Earl Granville, K.G.	5	0	0
Lord de L'Isle	10	0	0
Thomas Twining	2	2	0
Sir J. P. Boileau, Bart.	5	0	0
George Godwin, F.R.S.	1	1	0
Vice-Chancellor Sir W. Page Wood, F.R.S.	10	0	0
Sir W. H. Bodkin (Assistant-Judge)	3	3	0
Sir Rowland Hill, K.C.B.	3	3	0
Benjamin Shaw	2	2	0
Alfred Davis	10	10	0
Eugène Rimmel	5	5	0
Frederick Mocatta	2	2	0
James Marshall	2	2	0
Robert Dawbarn	1	0	0
Henry Vaughan	10	10	0
Philip Sancton	5	0	0
Somerset A. Beaumont	5	0	0
Decimus Burton, F.R.S.	1	0	0
W. Botly	1	1	0
Professor Robert Bentley	2	2	0
John Stuart Mill, M.P.	1	1	0
G. F. Wilson, F.R.S.	2	2	0
Henry Creed	1	1	0
The Marquis of Salisbury, K.G.	10	0	0
D. Roberton Blaine	2	2	0
William Hawes	2	2	0
Seymour Teulon	1	1	0
G. N. Hooper	2	2	0
Lord Taunton	5	0	0
Henry Cole, C.B.	1	0	0
A. Robb	1	1	0
S. Andrews	1	1	0
Thomas Dixon	1	1	0
Charles Telford	1	1	0
Edmund Burke	2	0	0
W. H. Gore Langton, M.P.	5	0	0
J. R. Fowler	1	0	0
John Rutson	1	1	0
W. Fothergill Cooke	2	2	0
J. P. Gassiot, F.R.S.	5	5	0
The Duke of Devonshire	10	0	0
Messrs. Chawner and Co.	2	2	0
Chas. Brooke, F.R.S.	1	1	0
T. Chappell	2	2	0
C. Candy	2	0	0
Alfred Haines	2	2	0
Major-General Sir William Gordon, K.C.B.	2	2	0
Bartlett Hooper	2	2	0
Carry forward	£795	7	0

Brought forward	£795	7	0
F. Richardson	1	1	0
J. Sharples	3	3	0
Henry Johnson	2	2	0
C. Skipper, jun.	1	1	0
G. T. Saul	1	1	0
Alderman D. H. Stone	5	5	0
G. H. Walker	1	1	0
R. Worthington	2	2	0
A. W. Miles	2	2	0
J. Harris Heal	2	2	0
John Bell	1	0	0
Messrs. Mander and Co.	2	2	0
B. S. Cohen	1	1	0
John Corbett	1	1	0
J. Zaehnsdorf	0	10	6
Major-General Viscount Templetown, C.B.	5	0	0
J. Pearce	3	3	0
Messrs. Huntley and Palmer	2	2	0
A. Glendining, jun.	1	1	0
A. Trevelyan	2	2	0
S. Harrington	1	1	0
Montague Ainslie	2	2	0
James Bentley	2	2	0
Capt. R. P. Oldershaw	1	0	0
E. C. Tufnell	2	2	0
Samuel Redgrave	1	1	0
Joseph Lockett	2	2	0
Messrs. Spicer, Bros.	4	4	0
John Tolhurst	1	1	0
Lord Ebury	5	0	0
C. Lawson	1	0	0
John Horton	1	1	0
W. Baker	1	1	0
Henry Briggs	1	1	0
James Heather	1	1	0
H. Reader Lack	1	1	0
C. Silvy	1	1	0
William Browne	1	1	0
T. Kibble	1	1	0
C. Garland	1	1	0
Antonio Brady	2	2	0

Collected in response to a Circular issued by the Birmingham Chamber of Commerce.

G. Dixon, M.P., Birmingham	5	5	0
Messrs. Smith and Wright, Birmingham	5	5	0
Messrs. Griffiths and Browett, Birmingham	5	5	0
Henry Weiss, Birmingham	2	2	0
W. H. M. Blews, Birmingham	2	2	0
W. Middlemore, J.P., Birmingham	5	5	0
Thomas Lloyd, Birmingham	2	2	0
Messrs. Elkington and Mason, Birmingham	5	5	0
Messrs. John Hardman and Co., Birmingham	2	2	0
Messrs. F. and C. Osler, Birmingham	5	5	0
The Proprietors of the *Birmingham Journal and Daily Post*	2	2	0
The Proprietors of the *Birmingham Gazette*	2	2	0
R. L. Chance, Birmingham	2	2	0
T. Avery, Birmingham	2	2	0
W. Tonks and Sons, Birmingham	2	2	0
W. Lucas Sargant, Birmingham	2	2	0
— Mountain (Messrs. Walter, May, and Co.), Birmingham	2	2	0
J. A. Williams, Birmingham	2	2	0
Henry Charlton, Birmingham	2	2	0
W. Bartlett and Sons, Birmingham	5	0	0
John P. Turner, Birmingham	0	10	6
W. H. Avery, Birmingham	2	2	0
Messrs. Peyton and Peyton, Birmingham	3	3	0
James Cartland, Birmingham	2	2	0
Messrs. Smith and Chamberlain, Birmingham	2	2	0
Messrs. Baker and Son, Birmingham	2	2	0
Messrs. Hinks and Wells, Birmingham	2	2	0
Messrs. Van Wart and Co., Birmingham	5	0	0
Carry forward	£952	15	0

Brought forward	£952	15	0
Messrs. Evans and Askin, Birmingham ..	2	2	0
C. Shaw, Birmingham	2	2	0
James Barwell, Birmingham..	1	1	0
Messrs. Chance and Co., Birmingham ..	5	5	0
*Messrs. Ashford and Winder, Birmingham	10	0	0
*William Aston, Birmingham	10	0	0
*Messrs. Chance and Co., Birmingham (2nd donation)	5	5	0
*Messrs. Griffiths and Browett, Birmingham (2nd donation)	5	5	0
*Messrs. Peyton and Co., Birmingham (2nd donation)	2	2	0
Messrs. Gammon and Co., Birmingham ..	2	2	0
Messrs. Messengers and Co., Birmingham ..	5	5	0
Total	£1,003	4	0

Messrs. J. M. Johnson and Sons have kindly placed at the disposal of the Council a number of their five-shilling English Catalogues of the Exhibition, sufficient to present each workman with a copy.

Subscriptions may be forwarded to the Financial Officer, at the Society's House.

The Council are now prepared to receive the names of any workmen recommended by their respective trades as fit and proper persons to undertake this important duty on behalf of their fellow workmen. A certain number have already been selected, and some of them are now in Paris.

Proceedings of the Society.

Society's Visit to Paris.

In making the arrangements for the members visiting Paris, it was considered that it would add materially to their convenience if they had the option of acting independently or of joining in parties to visit this or that establishment. On former occasions considerable difficulty was found in planning concerted arrangements, so as to suit the time and engagements of a number of persons. On the present occasion it was therefore determined to leave matters as far as possible in the hands of members themselves, who, with their cards of membership, could visit, singly or in parties, the various establishments whose proprietors or directors had courteously acceded to the request made by the Council of the Society for facilities of inspection. Nearly two hundred members took out their cards of membership; and very interesting visits, sometimes singly and sometimes in parties, were paid to various manufacturing establishments and other objects of interest in the French capital.

A party one morning paid a visit to the great Horticultural establishment in the Bois de Boulogne, belonging to the municipality of Paris, to whose care the public places and gardens of the city are entrusted. In this establishment are reared, at the public charge, the various plants and shrubs with which the city is so profusely adorned.

Through the kindness of the Prefect, permission was given for a small party of the members to pay a visit to the sewers. The party was received at the Place du Chatélet, and on decending a spiral iron staircase they found awaiting them some small, low carriages, travelling on rails laid on each side of the channel in which the sewage runs at the bottom of the great subterranean tunnel. The tunnel is well lighted, and the carriages had each four moderator lamps attached to them. These carriages, as soon as the party were seated, were pushed along by men who ran on each side. Over head were seen the large iron tubes for the conveyance of the water supply, one set of tubes carrying the drinking water, and the other that for general purposes, it being found necessary to have the two services in order to economise that of the best quality. At the top of the tunnel were seen the various wires for the telegraph service of the city. The sewer is well ventilated; and, notwithstanding the journey was performed over the surface of the sewage, there was but little disagreeable odour.

The tunnel, or large collecting sewer, passes from the Place du Chatelet, beneath the whole length of the Rue de Rivoli, as far as the Rue Royale, when it follows the course of that street. At the commencement of the Rue Royale the party were transferred to a barge, which conveyed them along the line of that street, and they emerged into the open air by the Madeleine, by a spiral staircase, similar to that by which they had descended.

To the carriages, as well as the barges, are attached arrangements which act, when required, as temporary dams or sluices, by means of which the flushing of the sewers is effected.

The gas service is not conducted through this tunnel, the authorities fearing accumulations of gas might take place, in the event of leakages, and explosions occur. Looking at the construction of this tunnel, and the manner in which the lateral connexions are formed, it is obviously just possible, in spite of the excellent ventilation, that an accumulation might take place at the crown of the sewer, and the precaution is no doubt a wise one. In Nottingham, where the gas mains are laid in the subways; they are so constructed that the escape always takes place at the highest point, and hence no accumulation of gas can take place.

The sewage is conducted to the outfall into the Seine at Asnières. Although at no great distance from Paris in the straight line, it is many miles distant following the windings of the river. It is understood that attempts to utilise the sewage have not hitherto been attended with much success.

A large party on a subsequent day visited the Catacombs.

A party also visited the new reservoirs for the water-supply of Paris, at Menilmontant, and were much interested in these splendid monuments of engineering skill.

A visit was also paid to the workmen's houses in the Avenue Daumesnil, now being constructed for the Emperor of the French, by Messrs. Newton and Shephard. They are built of concrete, on Mr. Shephard's system, as described by Mr. Newton in the Society's *Journal*, p. 317. The party were conducted over the buildings by Mr. Newton, junior, who explained very fully the method of these constructions.

The efforts which are now being made to provide economical houses and lodgings in Paris, and which are warmly supported and encouraged by the Emperor, offer valuable opportunities of study. The experiment now being made by order of the Emperor is of considerable extent; forty houses are about to be erected on the model of one already completed in the Avenue Daumesnil. Each house comprises three sets of apartments on different floors, and each apartment three rooms, including a kitchen, with a cellar. In the rear of the houses will be a garden, or promenade, common to all the inmates of the forty houses. This colony is intended for a co-operative association of working men, and is but the prelude to far more extensive operations. Near Bercy the experiment is being tried in another form; two hundred houses, constructed in like manner, and of which twelve are now in progress, are to be erected, each for a single family, having three rooms, besides the kitchen and cellar, and standing each in its own garden. The rent of each of these houses is fixed at 75 centimes, little more than 7d. per day, and at the end of ten years, it becomes the absolute property of the tenant. The intention is said

to be to erect twelve thousand houses of this class in various parts of the outskirts of the city.

A party also visited a large house, now in course of construction in the Rue de Naples, Boulevard Malsherbes, building on the system of bétons agglomérés—a special description of concrete—by M. Francois Coignet. The party were shown over the building, and its mode of construction was explained to them by the director of the establishment. The question of building in concrete is now attracting much attention, and the system seems worthy of the consideration of our architects and engineers. The Coignet system has now been in operation for about ten years in Paris, and large public works, churches, sewers, and barracks, have been satisfactorily executed. The subterranean galleries of the Exhibition are all built upon this system. In the building over which the party went, they were shown a well staircase, serving six stories, which was in fact one piece of artificial stone; indeed, the house itself, from bottom to top, is in reality one vast monolith.

Proceedings of Institutions.

Chorley Mechanics' Institution.—The tenth annual report congratulates the members on the continued prosperity of the Institution. The number of members for the past year has been—Honorary, 34; newsroom, 94; ordinary, 85: as compared with—Honorary, 37; newsroom, 87; and ordinary, 97; in the preceding year. The ordinary attendance at the night school during the past year has been about 35. An examination in connexion with the Lancashire and Cheshire Union of Institutes was held, when seven candidates were presented for examination, of whom three succeeded in obtaining certificates, and to whom local prizes have been awarded. The number of volumes taken out of the library during the year has been 800, as compared with 791 in the previous year. There have been ten penny readings during the winter months, which have been so far successful as to realise a profit of £5 17s. 6d. The accounts show that the expenditure has been £113 15s. 6½d., and that there was a deficit of £8 9s. 7½d.

EXAMINATION PAPERS, 1867.

The following are the Examination papers set in the various subjects at the Final Examination held in April last:—

(*Continued from page* 612.)

DOMESTIC ECONOMY.

THREE HOURS ALLOWED.

Section I.

1. Describe the best method of remedying the evil of smoky chimneys, and the causes which produce it.
2. Mention some of the bad effects of defective draining in human dwellings, and by what means, not very expensive, you might improve the ventilation of a close room.
3. Give clear directions to a young cook as to the faults to be guarded against in common culinary operations.
4. Give directions for roasting meat.
5. Give a receipt for Irish stew.
6. Give a receipt for cheap soups.
7. Give a receipt for making and boiling a plum pudding.
8. Give instances of waste of food, and directions how to use articles commonly wasted.
9. State the most important circumstance to be attended to in a poultry house.
10. What varieties of fowls are to be recommended for eggs only, for market fowls, and for general purposes?
11. Explain what is meant by hard water, and how the hardness of water may be reduced.
12. For what uses is hard water objectionable, and for what unobjectionable?
13. What is the composition of soap? Explain its action in cleansing articles by washing, and the precautions that ought to be observed in purchasing and keeping it.
14. What ought to be the yearly cost of clothing a girl between 14 and 16 years of age, the daughter of a mechanic, or of a day labourer? Support your opinion by a detailed estimate.
15. If a mistress saves one-fourth of an income of £100 during five years, and invests that sum, and the interest accruing therefrom, regularly in a savings bank at 2½ per cent., what sum will she have at the end of the time?
16. Explain what is meant by "deferred annuities," and the advantage of them.
17. Write out a table of troy weight and of avoirdupois weight, and state the purposes for which these weights are respectively used.
18. Write out tables of cloth measure and of measures of capacity.

Section II.

1. Write an essay on the duties of a maid of all-work.
2. Write a letter of advice to a girl about to take the place of kitchen-maid or nurse-maid.

POLITICAL AND SOCIAL ECONOMY.

THREE HOURS ALLOWED.

Questions from Stephens's Commentaries.

1. Under what circumstances is a master not bound by, or liable for, what his servant does, though it may be done in the course of or in relation to the service?
2. How far and for what purposes, and under what circumstances, has an infant the power of binding himself by contract?
3. In what way were Acts of Parliament prepared and drawn up before the time of Henry the Fifth; what alteration was made in his reign; and what is the form of enacting words now in use?
4. What is the meaning of going into committee upon a bill in the House of Commons, and what is the mode of proceeding therein?
5. What is the present position of Jews in England, in regard to their civil and political rights; and has any change in regard to them been made since the year 1853?
6. What are the provisions of the Royal Marriage Act; and when was it passed?
7. Can an army be lawfully maintained without the consent of Parliament? In what way is that consent given; and what are the Articles of War; and by whose authority are they made?
8. When and in what way were justices of the peace substituted for conservators of the peace; in what way are they appointed; and what is the meaning of the expression, "one of the quorum?"

Questions from Professor Fawcett's Manual for those who aspire to a First-class Certificate.

1. What are the elements of which profits consist; and what are the causes which determine their average rate?
2. What are the economical disadvantages and advantages (if any) of slave-labour?
3. What is the connection between the rate of profit and the rent of land?
4. In what way can the increased demand for a manufactured article diminish its price?
5. Under what circumstances and by what means can trades' unions affect the rate of wages?
6. What is the total amount of gold which has been produced from Australia and California, and what effect has it had upon prices?
7. State the argument for subjecting professional incomes and those arising from permanent property to the same rate of income-tax.

GEOGRAPHY.

THREE HOURS ALLOWED.

1. Enumerate, in geographical succession, the principal rivers upon the east and west coasts of Great Britain respectively: distinguish those amongst them which have the largest areas of drainage, and name the principal tributaries of these latter.

2. Describe (with reference to outline, surface, drainage, mineral produce, and chief towns), or, if you prefer it, draw a map of, any one county either of Great Britain or Ireland.

3. Give a brief account of the principal mountain systems of the European continent; also of the principal lowland plains.

4. Describe briefly either one of the following countries:—France, Spain, Italy; with reference to outline, features of surface, river-basins, climate, produce, and chief towns.

5. Make a list of the countries of Asia, naming the capital, and (in the cases of maritime countries) the chief seaports, of each.

6. Write a brief account of the rivers Yang-tsze, Ganges, Euphrates, and Obi—as to course, outlet, comparative area of basin, and chief tributaries.

7. Enumerate the various Australian colonies, with their principal towns: also say in what the natural resources of each mainly consist.

8. Draw a map either of New Zealand or of any one of the Australian colonies: if of New Zealand, mark on it the different provinces.

9. Give a brief account of Canada and the adjacent provinces of New Brunswick and Nova Scotia—as to extent, surface, climate, productions, and towns.

10. In what parts of the world are the trade winds experienced? In what region do monsoons occur? What is the characteristic difference between the two? How are these winds respectively accounted for?

11. How is the geographical distribution of plants affected by latitude? Mention some of the characteristic food plants proper to the Old and New Worlds respectively.

12. Amongst the *carnivora*, what characteristic differences are met with in comparing the animals native to the Old and New Worlds respectively? What orders (in the list of *mammalia*) are wanting in the zoology of Australia? To what order do the native mammals of Australia almost exclusively belong?

ENGLISH HISTORY.

THREE HOURS ALLOWED.

General Questions.

1. Give the dates of the following events:—The invasion of this country by Julius Cæsar; the supposed landing of Hengist and Horsa; the consolidation of the Heptarchy; the accession of Alfred the Great; the appointment of Dunstan to the see of Canterbury; the accession of Canute, and of Edward the Confessor; the commencement of the several dynasties which have occupied the throne of England from the time of the Conquest to the present day.

2. Mention the most eminent sovereigns of the several dynasties, and state the reasons for your selection.

3. In what reigns did the following events take place:—The conquest of Ireland; the conquest of Wales; the battles of Cressy and of Agincourt; the grant of Magna Charta; the establishment of the House of Commons; the union of the Roses; the Reformation; the Great Rebellion; the union of England and Scotland, of Great Britain and Ireland; the capture and defence of Gibraltar, the siege of Fort St. David by Dupleix; the battle of Plassey; the declaration of American Independence; the reformation of the Calendar.

4. By whom was Christianity introduced into this country? in what part of it, and why? What form did it assume? By what class of men was it disseminated? What material evidences of this work remain at the present time? Explain such words as minster, minister, abbey church, the priory, Grey Friars and Blackfriars, Eleanor Cross, cathedral, cloister.

5. Explain what is meant by Papal and Royal Supremacy; by what sovereign was the former abrogated in this kingdom, and on what grounds?

6. Explain briefly the main provisions of the four great charters of English liberties; and mention the periods at which they were enacted.

7. What was the purport of the first Act of Settlement, and what of the second?

8. What is meant by the expression, "The British Constitution?"

9. In what persons is the legislative and executive power vested in these kingdoms? in whom the administration of justice? and state what precautions have been adopted from time to time to secure its impartiality.

10. What are the special prerogatives of the three estates of this realm?

11. Between what parties, with what results, and at what time, were fought the battles of Hastings, Tinchebrai, Damme, Sluys, Mortimer's Cross, Bosworth, Flodden, Naseby, Quiberon Bay, Nile, and Trafalgar?

12. Refer the following names, events, &c., to their proper periods in English history:—

(*a.*) Wicliffe, Chaucer, Sir Thomas More, Spenser, Lord Bacon, Ben Jonson, Dryden, Pope, Newton, Locke, Addison, Hume, Gibbon, Dr. Johnson, Wordsworth.

(*b.*) Introduction of printing, poor laws, Sunday schools, steamboats, power loom, gas, railways, newspapers.

Special.

1. Divide the reign of Charles I. into three parts—1625-1629, 1629-1640, 1640-1649; state briefly the main events in the three divisions, and name the chief leaders on both sides.

2. What were the chief points in debate between Charles and his parliament in the first and second of these periods?

3. Draw a brief parallel between the life and principles of any two leaders of the parties which were opposed to one another.

(To be continued.)

TECHNICAL EDUCATION.

(*Continued from page* 614.)

14. *From J. Scott Russell, Esq., F.R.S.*

5, Westminster-chambers, S.W.,
June 24, 1867.

Sir,—I have the honour to acknowledge the receipt of your letter of the 31st ult., enclosing copy of a letter addressed to the Chairman of the Schools Inquiry Commission by Dr. Lyon Playfair, and inquiring whether I agree with the substance of that letter.

In reply, I have to state that in much that Dr. Playfair has said I entirely agree, and that from my own recent personal inquiries into the state of technical education in Switzerland, Germany, and France I have reluctantly come to the conclusion that it is much more advanced in those countries than in ours.

As a Juror in the Paris Exhibition I have come to the conclusion that the higher class of education given in each of those countries to the workmen in its skilled trades, as well as the superior professional education given to the higher classes of men employed in technical professions, is everywhere visible in the works exhibited by those countries. And I attribute the surprising strides those countries have been making for the last ten years in many of the great staple branches of mechanical construction and manufacture to the admirable scientific and practical training which the governments of those countries provide for their working classes.

I enclose a memorandum, which at the request of some other jurors I prepared in Paris last month, as an expression both of my own opinion and that of many others with whom I have conversed on this subject. I may say

that we had felt it our duty in some way to call the attention of Government and the public to this matter, when Dr. Lyon Playfair's letter appeared in the *Times*.

So convinced was I of the importance of technical education to this country, that before the opening of the present Exhibition in Paris I took the opportunity of an invitation which had been given me to assist a meeting of the Society of Arts in the Technical Museum attached to the University of Edinburgh, to address the meeting on this subject, and I enclose also a newspaper report of that address.

I have, &c.,

J. Scott Russell.

Henry J. Roby, Esq., M.A., &c., &c.

15. (*Enclosed in Mr. Scott Russell's Letter of the 24th June*, 1867.)

Memorandum.

The fourth great International Exhibition has afforded an excellent opportunity for marking the relative progress of different countries in the arts, manufactures, and trades which contribute to the wealth and power of nations. We have especially noted the progress of other nations in those mechanical and constructive arts and trades in which, in 1851, England exhibited pre-eminent excellence. We have to record that in many of these some other nations appear to have made much more rapid progress than ourselves, so that we are *relatively* falling off. And we especially note that our falling off is not in unimportant departments, but in some of those which had formerly constituted our staple excellence.

We have to specify that those branches, in which other countries have now shown more rapid advancement, are some of our own great manufactures of steel and iron, steam machinery, locomotive engines, and tools and manufacturing machinery in general. We do not say that in all of these other nations have excelled us, in some they have not yet equalled us. But what we do feel, and therefore frankly state is, that their progress has, in the last 16 years since the first Exhibition of 1851, been remarkably greater than ours.

There are other branches of arts and manufactures in which possibly the reverse is the case. Glass and pottery, and the arts of design and construction of beautiful patterns both in form and colour, have made remarkable progress throughout England during the same period; we therefore confine our present remarks to the mechanical and constructive arts, not commonly called fine arts.

Dissatisfied with our national progress, we have naturally turned our minds to search for the cause of the progress of other nations and for the cure of our own deficiency. We find that during these years some nations have been occupied in diligently promoting the national education of the various classes of skilled mechanical workmen, for the purpose of giving skill to the unskilled and rendering the skilled more skilful. We find that some nations have gone so far as to have established in every considerable town technical schools for the purpose of teaching all the youths intended to be craftsmen those branches of science which relate most nearly to the principles of their future craft. Workers in metal are taught the nature of the mechanical powers with which they will have to work, and the chemical properties of the materials they will have to operate upon; engine builders are taught the principles of heat and steam, and the nature of the engines they have to make and work; shipbuilders are taught the laws of construction, hydraulics, and hydrostatics; and dyers and painters are taught the laws of chemistry and colour. All skilled youth are taught geometry, drawing, and calculation; and in many countries every youth who shows great talent in any department is promoted to a higher training school, and there educated at the public cost.

Besides these local schools, other countries have technical colleges of a very high class for the education of masters and foremen in engineering, mechanics, merchandise, and other practical and technical professions.

We have not failed to notice that it is precisely those nations which have been systematically giving a course of preparatory training and education to their population in their skilled trades that have shown the most marked progress in national industry in these successive exhibitions.

Prussia, Switzerland, Belgium, France, America seem to make progress in proportion to their excellence of educational training:—Prussia in steel, iron, and general engineering work; Switzerland in scientific engineering, machinery, and watch and telegraph work, and in textile manufactures; Belgium in metal working and mechanical trades; France in metal work, and in steam engines, engineering structures, naval architecture, and steam navigation. All these nations seem to exhibit growing skill and progress in proportion to the excellence of the education and training they give to their manufacturing population.

It becomes therefore a serious national question for England and the English, whether they have or have not been wise in neglecting to take adequate measures of a national character for the complete technical training of all the youth destined to skilled trades and occupations. By this training we do not on the one hand mean elementary education, nor on the other hand do we mean any substitute for a practical working apprenticeship. We mean a schooling midway between the elementary day school and the workshop, which the youth should enter after he knows reading, writing, and counting, in order to learn to apply his reading, writing, and calculation to the purpose of acquiring such knowledge of mathematics, mechanics, mineralogy, chemistry, drawing, &c., as shall fit him more aptly and perfectly afterwards to learn and to profit by the teaching of the workshop and the office. It is unquestionable that apprentices to trades, coming into the workshops with this preparation, will make greatly more rapid and certain progress than those who enter direct from the elementary school.

But in England we can scarcely as yet be said to possess such schools. Certainly they are not uniformly distributed over the towns of England; and it seems that in no country have they thriven or even existed except when organized and sustained by nations at large, acting through their governments.

We have therefore to recommend to the serious attention of the British nation the consideration of the importance of establishing a national system of technical and trade education.

J. Scott Russell.

Paris, May, 1867.

16. *From E. W. Cooke, Esq., R.A., F.R.S.*

The Ferns, Hyde-park-gate, South Kensington, June 28, 1867.

My Lord,—Having read with very great interest Dr. Lyon Playfair's admirable letter to your Lordship, I beg to state, though with considerable regret, that I am compelled to agree entirely with the opinions and conclusions expressed in that letter.

During a very careful and impartial examination of the varied productions of European countries in the International Exhibition at Paris, a multitude of instances met my eye which impressed me with the decided superiority of the industrial productions of the Continent over those of our own country. It must be distinctly understood, however, that I refer only to works of artistic taste—not to fine art—in matters connected with objects of useful and ornamental character belonging to the peaceful arts. With matters of war, whether military or naval, or the multitudinous inventions and triumphs in machinery, I have nothing to say, having no experience in those departments; nor have I any knowledge of the numerous economic manufactures, removed in a great measure from such as are the

result of fine taste and æsthetic feelings. In these latter objects it is that I feel the truth and justness of Dr. Playfair's broad and honest opinions. In very numerous instances I could not but observe the great advance made in the design as well as execution of works during the last ten years, in which I had sanguinely hoped we in England would have greatly excelled, if not triumphed, over our Continental neighbours. In this I am sorry to confess I have been disappointed, and am of opinion that it behoves the Executive Government and the chief municipal bodies of our country to lose not a moment in the consideration of this most important subject, in which the trade and commerce, the prosperity of our working men, and, I may say, our *national honour*, are so vitally and so deeply concerned and interested.

I cannot at present enter into details, but your Lordship will perceive that I entirely concur in every word of Dr. Playfair's letter.

I have, &c., E. W. Cooke, R.A., F.R.S.

To the Right Hon. Lord Taunton,
&c., &c.

17. *From Wm. Spotten, Esq.*

Belfast, June 29, 1867.

Sir,—In reply to your letter of 27th instant, I beg to state that I agree with the substance of the inclosed letter.* I am &c.,

Wm. Spotten.

To H. J. Roby, Esq.,
&c., &c.

18. *From A. J. Mundella, Esq.*

Nottingham, June 29, 1867.

My Lords and Gentlemen,—In reply to the inquiry addressed to me through your secretary, I have the honour to state that in the main I agree with Dr. Playfair's letter of the 15th ultimo, but I am of opinion that art and industrial education, without a thoroughly organized system of primary instruction, will not remove the danger which threatens our manufacturing and commercial supremacy.

I trust it will not be deemed presumptuous if I lay briefly before you the result of my observation on a subject in which I have long been interested.

The branch of industry with which I have been connected for thirty years past is the manufacture of hosiery. I am the managing partner of a firm employing five thousand (5,000) workpeople, with establishments in Nottingham, Derby, and Loughborough, employing more than four-fifths of the number, and with branches at Chemnitz and Pausa, in Saxony, employing about seven hundred persons.

In addition to the opportunities and experience which the superintendence of these establishments has afforded me, I have for many years past formed friendships with manufacturers in France and Germany. I have had free access to their warehouses and workshops, and I am as well acquainted with the progress of my own branch of industry in those countries as in England.

As the result of my observation I have for four or five years past been increasingly alarmed for our industrial supremacy; and my experience of the Paris Exhibition has only confirmed and strengthened my fears. In my own branch we still maintain the lead in the majority of articles, but the progress made by France and Germany since 1862 is truly astonishing, and it has been much greater than our own.

I am of opinion that Englishmen possess more energy, enterprise, and inventiveness than any other European nation. The best machines in my trade now at work in France and Germany are the inventions of Englishmen, and in most cases of uneducated workmen; but these machines of English invention are constructed and improved by men who have had the advantage of a superior industrial education. The largest hosiery machine-shop in France is that of Monsieur Tailbours, at St. Just; models of all the best English machines have been purchased and imported, and are there improved and constructed on thoroughly scientific principles, under the superintendence of a young man who, I was informed, took high honours at the school of the Government in Paris.

Precisely the same thing is taking place in Saxony, but the Saxons are, in respect of education, both primary and industrial, much in advance of the French, and in my branch they are our most formidable rivals.

In Nottingham, where the best machinery in the world is required and used in the production of hosiery and lace, there is no such thing as industrial education, and, greatly as it is to be desired, I am acquainted with many good mechanics and superior workmen to whom it would be of no service, inasmuch as they can neither read nor write.

The contrast betwixt the workpeople of England and Saxony, engaged in the same industry, is most humiliating. I have had statistics taken of various workshops and rooms in factories in this district, and the frightful ignorance they reveal is disheartening and appalling. I was born and educated amongst the working classes, and all my life have been in close association with them, but I never realised the condition of the *lower masses* of our workpeople till I took the pains to examine them personally in the manner I have indicated.

In Saxony, our manager, an Englishman of superior intelligence, and greatly interested in education, during a residence of seven years has never yet met with a workman who cannot read or write. And not in the limited and imperfect manner in which the majority of English artizans are said to read and write, but with a freedom and familiarity that enables them to enjoy reading and to conduct their correspondence in a creditable and often superior style. Some of the sons of our poorest workmen in Saxony are receiving a technical education at the Polytechnic schools, such as the sons of our manufacturers cannot hope to obtain.

Whilst, therefore, I believe that the English workman is possessed of greater natural capacity than any of his foreign competitors, I am of opinion that he is gradually losing the race through the superior intelligence which foreign governments are carefully developing in their artizans.

The influence of strikes and lock-outs has been undoubtedly against industrial progress. But the worst practices of trades unions are the result of the gross ignorance of the majority of workmen who are connected with them. I succeeded, nearly seven years ago, in forming a board of arbitration and conciliation for the hosiery trade of this district, and no strike has taken place since its formation. Leicester has recently followed our example, and during the past week the lace trade has done the same. This is the only solution, in my opinion, of that difficulty.

The education of Germany is the result of a national organization, which compels every parent to send his children to school, and, after having laid the foundation of a sound education, affords to all those who have the capacity and inclination the opportunity of acquiring such technical knowledge as may be useful in the department of industry for which they are destined.

If we are to maintain our position in the industrial competition, we must oppose to this national organization one equally effective and complete. If we continue the fight with our present voluntary system, we shall be defeated. Generations hence we shall be struggling with ignorance, squalor, pauperism, and crime; but with a system of national education made compulsory, and supplemented with art and industrial education, I believe within twenty years England would possess the most intelligent and inventive artizans in the world.

My Lords and Gentlemen,
Yours, &c., A. J. Mundella.

Her Majesty's Schools Inquiry Commissioners.

[* The enclosed letter was Dr. Lyon Playfair's.]

19. *From James Young, Esq.*

Chemical Works, Bathgate, July 4, 1867.

Sir,—I had the honour to receive your letter of 20th June, requesting me to give you my experience as to whether I agree in substance with Dr. Lyon Playfair's letter to Lord Taunton. I was a juror in the English Exhibition of 1862, but in the French Exhibition I am only an exhibitor; as such I have spent about a month in Paris studying the Exhibition, and there had the opportunity of meeting many jurors of different nations. I am bound to say that my experience accords with that of Dr. Lyon Playfair. So formidable did the rate of progress of other nations appear to many of us, that several meetings of jurors, exhibitors, and others took place at the Louvre Hotel on the subject. The universal impression at these meetings was that the rate of progress of foreign nations in the larger number of our staple industries was much better than our own. But it must be stated that a large number of our first-class machine and other manufacturers are not exhibitors in Paris, whereas other nations, I believe, have taken care to bring forward their very best; still, the great progress of other countries is evident. The reason for this increased rate of progress is the excellent system of technical education given to the masters of workshops, sub-managers, foremen, and even workmen.

England for a long time excelled all other countries in the finish of her machines; but now we find that foreign machine makers are rapidly approaching us in finish, and, having skilled and intelligent labour cheaper than ourselves, are progressing in all the elements of manufacturing.

Permit me to use my own case as an illustration. Originally I was a working man, but have succeeded in increasing the range of manufacturing industry. The foundation of my success consisted in my having been fortunately attached to the laboratory of the Andersonian University in Glasgow, when I learned chemistry under Graham, and natural philosophy and other subjects under the respective professors. This knowledge gave me the power of improving the chemical manufactures into which I afterwards passed as a servant, and ultimately led to my being the founder of a new branch of industry, and owner of the largest chemical manufacturing works of the kingdom. It would be most ungrateful of me if I did not recognise the importance of scientific and technical education in improving and advancing manufactures. Many men, without such education, have made inventions and improvements, but they have struggled against enormous difficulties, which only a powerful genius could overcome, and they have been sensible of the obstacles to their progress. Stephenson, who so greatly improved locomotives, had to be his own instructor, but he sent his son Robert to Edinburgh University, and the son did works at least as great as the father, and with far less difficulty to himself.

The improvement in locomotion has necessarily created great competition in the industries of the world, and unless we add skilled instruction to manual labour, England cannot expect to maintain her position in the industrial race. I have &c., James Young.

H. J. Roby, Esq., &c., &c.

THE PRUD'HOMMES SYSTEM.

Historical Sketch.

The following is an historical sketch of the prud'homme system in France. The original idea of this institution dates back, in France, to a very early period. In those times the word prud'homme (*homo prudens*) was employed to designate judges, experts, and municipal officers. In the year 1296, in the reign of Philip le Bel, the Council of the City of Paris determined to appoint twenty-four prud'hommes, whose duty should be to accompany the chief of the merchants and the municipal councillors in their visits to the masters.

In 1414, the citizens of Lyons were authorised to nominate a prud'homme, to put an end to the disputes between the merchants and manufacturers attending the fairs. Later, an institution, called the "Tribunal Commun," was established at Lyons, and its duty was to settle amicably disputes between the silk manufacturers and their workmen.

After the abolition of trade guilds, in 1791, it was found necessary, in order to counteract the abuses which arose from an unrestricted liberty in trade and commerce, to lay down rules for the regulation of all matters arising between manufacturers and their workmen. With this object in view a law was passed in the year XI., which, after authorising the establishment of deliberative chambers of manufactures and trade, punishes with fine and imprisonment every combination, either on the part of masters for the purpose of lowering wages, or on the part of workmen to strike, or prevent others from working, or to stop work in any workshop. This law enacts that all police-court matters between workmen and apprentices and manufacturers shall be taken before the Prefect of Police in Paris, before the commissary-general in such towns as possess such an officer, and before the mayor or deputy-mayor in other places. This, however, not being satisfactory, in 1806 a further step was taken, and the Council of Prud'hommes was established. Whilst, however, the law only established this at Lyons, the Government by a decree formed Councils of Prud'hommes in other manufacturing towns. These arrangements remained in force until 1848. Complaints were made that workmen were not admitted to the Council of Prud'hommes, and that there was an unjust preponderance in favour of the manufacturers. In 1848, therefore, the Council of Prud'hommes was re-organised on an entirely new basis. The electors are declared to be manufacturers (patrons), masters of workshops (chefs d'atelier), foremen (contre-maitres), 21 years of age, and resident for six months within the district; whilst the same parties are eligible to serve on the council provided they are 25 years of age, have a knowledge of reading and writing, and have been domiciled for a year within the district. In 1853, a considerable modification was made in the arrangements. The Prud'hommes are not judges in the true acceptation of the term. They have special functions, of an exceptional character, of the same nature as those of Councillors of the Prefecture. Their powers are not executive, but simply administrative, and they are not exempt as judges from serving on juries. They hold their situations by election, except the president and vice-president, who are appointed by the Emperor. The Prud'hommes differ from civil or commercial judges, inasmuch as they have no executive power, and the same oath of office which they take before the prefect is not the oath of investiture which the members of Tribunals of Commerce take before the Imperial Court. There seems, however, to be some difference on this head, and the precise position which the prud'hommes hold as compared with judges proper seems not quite ascertained. In some of their proceedings they are treated as judges, whilst in others they are not. These, however, are nice points for discussion among French lawyers, but are not of any practical interest to the English reader.

How the Council is Formed.

A Council of Prud'hommes is established on a resolution, passed by a Chamber of Commerce, or Deliberative Chamber of manufacturers, requesting the establishment of such a body. This request is communicated to the Préfect, who transmits it to the Minister of Agriculture and Commerce, with the following documents:—1. The vote of the Municipal Council undertaking to pay the expense; 2. A table showing all the industries amenable to the Council proposed to be established, such industries being placed under their proper divisions, the number of prud'hommes to be elected in each of them, and the

number of masters and workmen, whether electors or not, included in each division. A decree is then issued, in conformity with the regulations of Government, after the application has been passed, by the Council of State. This decree also fixes the number of which the Council is to consist, which must be six at least, exclusive of the president and vice-president, who, as has before been stated, are named by the Emperor.

The members forming the Council of Prud'hommes are elected by masters (patrons),* small masters (chefs d'atelier), foremen (contre-maitres), workmen connected with the trades comprised in the decree.

The qualifications for electors are as follows:—Masters ("patrons") must be of the age of 25 years, must have been licensed for five years at least, and for three years within the district of the Council. The smaller masters ("chefs-d'ateliers), foremen ("contre-maitres") and workmen, must be of 25 years of age, and have exercised their craft for five years at least, and have been resident in the district for three years.

Persons eligible to serve on the Council must have the same qualifications as an elector, but in addition they must be 30 years of age, and able to read and write. Foreigners can neither elect nor be elected.

The list of electors is settled by the mayor of the district, and lodged with the prefect, who summons the electors to meet; the two classes of electors, masters and workmen, meeting separately, and separately electing representatives of their own class. There is an equal number of Prud'hommes in each class. In addition to public notices of the election, each elector has sent him a special notice. The mayor, or deputy-mayor, presides at these elections. The President and Vice-president hold their office for three years; and one-half of the Council retires every three years. Vacancies by death or legal incapacity are filled up by election, and the party elected to fill a vacancy holds office for the remainder of the period his predecessor would have done.

The préfect administers to each Prud'homme the oath of office, *i.e.*, of obedience to the law, allegiance to the Emperor, and for faithful discharge of his duties.

The Council of Prud'hommes is divided into two chambers, one termed the private chamber (a chamber of arbitration or reconciliation), and the other the general or judicial chamber.

The Chamber of arbitration is composed of one prud-'homme manufacturer and one prud'homme of the working class. This chamber must sit once a week at least for the settlement of disputes, and is presided over by the president or vice-president.

The General Chamber is composed of an equal number of master and workman prud'hommes, besides the president and vice-president, and this number must not be less than two of each class, whatever the number of the whole council may be.† The General Chamber must meet twice a month at least, to decide judicially on cases which have not been settled by arbitration. There is a paid secretary attached to each council.

The Duties and Powers of the Council of Prud'hommes as regards both Civil and Criminal Proceedings.

Firstly, what persons are amenable to them.

Secondly, what disputes come under the jurisdiction of the Council.

Councils of Prud'hommes are competent to decide in all cases of dispute between manufacturers, small masters, foremen, journeymen, and apprentices, whatever be the amount in dispute; but their jurisdiction does not include other persons than those named above' and thus wholesale or retail dealers, not being manufacturers, do not come within the jurisdiction, nor do the clerks or agents who sell the goods or keep the books, nor the proprietor who lets his manufactory, if he does not carry on the business either by himself or by some one on his behalf. As regards the workmen, no distinction is drawn between the workman in a factory or one who works to order in his own house. All that is necessary is that he should be under the actual control or order of some manufacturer; but to this there are some exceptions by the courts of law. Thus the artist who furnishes designs for the manufacturer cannot be brought before the Council of Prud'hommes, for he is not under the orders or control of the manufacturer.

The Council can only take cognizance of disputes relating to the trades in which the parties are engaged, or the arrangements connected therewith. All other disputes, as well as matters relating to trades not named in the decree establishing the Council, are excluded.

Disputes relating to apprenticeship matters, discharge of workmen, &c., are within the jurisdiction of the Council. The Council have power to settle the damages or restitutions which shall be made between parties on the cancelling of a contract, and to determine the indemnity to be paid by a master or workman convicted of having decoyed an apprentice from his master's house. When, however, a third party, as is frequently the case in apprenticeship matters, is concerned, such as the parent or guardian, the Council has no power to interfere. An agreement between a master and his clerk to teach the clerk the business, is not an apprenticeship matter, and does not come under the jurisdiction of the Council.

As a general rule, the place where the defendant dwells determines the tribunal before which the complaint is brought; but, as regards the Council of Prud'-hommes, it appears that this rule does not hold, and the jurisdiction of the Council extends over all manufacturers and workmen engaged in the manufactures of the district covered by the decree establishing the Council, notwithstanding the parties may happen to dwell beyond the limits. By the special words of the decree establishing the Council of Prud'hommes at Dijon, this regulation is laid down, and it may be taken as a rule that the situation of the factory, and not the domicile of the party, determines the tribunal. The district over which the jurisdiction extends is laid down in the decree, thus in Lyons it is declared to be the three cantons into which the city is divided. By consent, however, of both parties, the Council may proceed in cases out of their jurisdiction. Councils of Prud'hommes have no power in cases between two manufacturers; the object of their establishment is to settle disputes between them and their subordinates. The Councils cannot take cognizance of a question of warranty against a third party, neither master nor workman. Such a claim must come before the regular tribunals. In cases where the matter not within their jurisdiction affects public rights the Council declines to proceed, but if it is purely of a private character the Council, in the absence of objection by the parties, goes on with the proceedings. The main object of the Prud'hommes Councils is to reconcile the parties, and, in default of reconciliation, to pronounce judgment on the matters in dispute.

The Chamber of Arbitration or Reconciliation.

The great object for which these Councils have been established is, by means of arbitration, to settle the small differences which are daily taking place between manufacturers and workmen, and everything coming within the powers of the Councils is submitted to their arbitration. The Chamber of arbitration is specially established for this portion of the business, and is composed, as has been said before, of a prud'homme master and a prud'homme workman, with the president. The parties must appear in person on the day and hour named in the letter sent by the secretary. The appear-

* "Patrons" are defined as those who manufacture their own materials; "chefs-d'ateliers" as those who, with or without the aid of journeymen and apprentices, carry on their work in their own homes, and make up the materials supplied by others, and according to patterns and directions given them. The editor is, however, informed by a Prud'homme that there is no distinction between the chef d'atelier and the contremaitre, and that both are properly translated "foreman."

† The "Patrons" form one class, the "chefs d'atelier," "contremaitres," and "ouvriers" form the other class.

ance of the parties in person is absolutely imperative, except in case of sickness, and then a party may be represented by a relative merchant or manufacturer, duly authorised by letter. Parties may be assisted by counsel. If the person requested to attend by the secretary does not appear, a citation, naming day and hour of attendance, with a short statement of the complaint, is placed in the hands of the bailiff to serve on the defendant. The parties are required to state their case carefully in plain and simple language, and if they offend in this particular, after being called to order by the president, they may be fined to an amount not exceeding 10 francs, and notice of such fine is affixed in some public place in the town or district. When the chamber of reconciliation does not succeed in reconciling the parties, the case is sent at once to the general chamber for legal judgment. Minors and married women, under certain circumstances, are amenable to the chamber, but, as these proceedings depend on points of French law, which differs so entirely from English law, it is needless to enter upon them here. The award made by the chamber has not the force of a judgment, but is binding on the parties as a private contract, and has to be enforced as such contracts by the regular tribunals. Either party may put the other to his oath, and, this, if taken, is conclusive, but, if refused, the Council, not acting as judges, have no power to condemn, but simply insert the fact of refusal in their proceedings. The law declares that no action shall be brought before the courts unless there has been a previous proceeding before the Council of Prud'hommes.

Of the General Chamber, or Chamber of Judgment.

The General Chamber takes cognizance of all cases in which the attempt at reconciliation has failed. Its judgment is without appeal in all cases were the claim does not exceed 200 fr. (£8), but beyond that sum an appeal lies to the Tribunal of Commerce. The parties are brought before the chamber by citation, preceded by a letter from the secretary. Minors and married women can sue and be sued before this chamber (according to the special law of France relating to parties in these conditions). The defence must be made in three days after notice served by the bailiff, and the defendant puts in a statement in writing of the particulars of his defence, and sets down the case for hearing for the first day of the Council's sitting. The time for putting in the defence may be enlarged. In case of non-attendance judgment may be given by default. The appeal, if any, must be made within three months. Immediate execution may be obtained, and in cases of appeal the Council may in their discretion order provisional execution in the way of security for the payment of the amount, and this only a personal security if the parties be solvent. The Council being what is termed an exceptional court, has no power of executing its judgments, but it has the power of interpreting its decisions, a power which belongs to all tribunals without exception. The Council of Prud'hommes have power to pronounce judgment against the person in certain cases, thus in matters of commerce it has this power when the debt exceeds 200 frs., or when the damages and interest exceed 300 frs.

Powers of Prud'hommes in Matters of Police.

The jurisdiction is confined in the same way as its civil jurisdiction. It deals only with matters occurring to disturb the order and discipline of the workshop; all other disturbances go before the ordinary police tribunals. Insubordination, bad language, blows, &c., come under the meaning of disturbing the order and discipline of the factory. In all cases under their jurisdiction the Prud'hommes appear to have the same powers as police magistrates, and their decisions are subject to the same right of appeal.

Other Duties of Prud'hommes.

They are invested with the duty of protecting property in design and trade-marks, settlement of accounts between manufacturers and managers or foremen; inspection of workshops; the reporting infringements of the laws. The deposit of designs is made in the office of the secretary of the Council, and specially registered. In cases of dispute as to the right to a design, the Council issues a certificate stating which of the manufacturers has made the first deposit. The duties of the Prud'hommes go no further than this. The question is tried before the Tribunal of Commerce. Formerly the Council had jurisdiction in matters of trade marks, but this is no longer the case, such matters being now under the jurisdiction of the Tribunal of Commerce.

The Prud'hommes have jurisdiction in settling accounts between merchants and those entrusted with the making up of materials entrusted to them, and these accounts, when the balance is struck, are registered with the Prud'hommes, and a copy is delivered to the employer and the employed. When the balance-sheet shows a balance due from the employed to the merchant this balance is paid by means of monies kept back by the next employer, and this is compulsory on him, and he must retain in his hands for this purpose one-eighth part of the price of the work done. The new employer is liable to pay the accounts, up to 500 frs., when the employed has left the former employer without his consent or legal cause.*

The Prud'hommes, in deciding between masters and workmen, may take into consideration the custom of the trade when the agreements between the parties are silent.

The Prud'hommes are charged with the inspection of workshops; and this duty consists in collecting important statistics of the trade, numbers of workmen employed, &c., the improvements of which the manufacture is susceptible, its fallings off, the means of overcoming their shortcomings, in short, everything in which the public interest and industrial progress is concerned. The Prud'hommes are bound to give the manufacturers two days' previous notice of their coming, but they have no power to call for the books of the trade, nor for information as to new processes which it is required to keep secret.

The Prud'hommes are judges in matters of infraction of laws and rules of trade. Managers as well as workmen are not permitted to divulge trade secrets, and are punishable by the Prud'hommes if they do so. The like applies to breaches of trust and theft. The Prud'hommes draw up a *proces-verbal*, and this is acted upon at once by the other tribunals, who award punishments accordingly. Combinations among workmen come under their jurisdiction, but combinations, by the law of 1864, are now permitted so long as the means employed are not in themselves illegal. Whoever by violence, threats, or illegal means endeavours to create a strike, either among masters or men, with the view of raising or lowering wages, or interferes with the freedom of labour, is liable to an imprisonment of from six days to twelve months, and a fine of from 16 fr. to 3,000 fr. Prud'hommes neglecting their duties may be dismissed.

PARIS EXHIBITION.

The English and American departments, and, to a less extent, the German also, have been in a state of great excitement about a trial which has taken place to ascertain the relative value of two iron safes exhibited, one by Mr. Herring, of New York, the other by Mr. Chatwood, or rather the Chatwood Company, of Bolton-le-Moors. Mr. Herring challenged all the world to a trial of safes, and Mr. Chatwood accepted the challenge, the stake being £600 on each side, the balance of the loser's stake, after deducting costs of the trial, to be divided between certain charities of Paris, London, and Washington, to be named by the winner. A committee of five engineers was appointed to watch over the operations and pronounce upon the results. Two gentlemen, Robert Mallet, Esq., C.E., F.R.S., and Robert F. Fairlie, Esq.,

* The object of this law is to prevent masters from decoying men from their places.

C.E., both of London, were nominated by Mr. Chatwood, and J. E. Holmes, Esq., C.E., and J. R. Pickering, Esq., C.E., both of New York, by Mr. Herring; these four gentlemen then elected a French engineer, M. Paul Douliot, of the firm of Cail and Co., of Paris, as their president, and nominated Mr. W. J. Hazle, of the Whitworth Company, to act as secretary.

The conditions, as they appear in the printed copy of the terms of agreement, were, that each party might make use of gunpowder, picklocks, drills, taps, cold chisels, or any other tools or implements used by burglars, but the terms of this agreement were not maintained. Each party, by consent, employed three men to open the other's safe; Mr. Herring sent to New York for two noted locksmiths, and obtained the volunteer aid of the foreman of a German safe-maker; Mr. Chatwood selected two of his own men, and his number was completed by a Manchester man, also a volunteer. As soon as the terms of the trial were agreed upon the two safes were delivered into the charge of the committee, who examined them in order to see that no improper alteration or arrangement had been made in them since the challenge was given. They were then placed in the English testing-house for the trial. The next point was the production of the tools which each party was to use against his opponent's safe, and here the conditions of the agreement seem to have been entirely broken through. Mr. Chatwood's men carried theirs in a bag with a block-tin hammer (made use of by burglars) in a gun-case, so that they might have been carried into any house without creating the least suspicion; Mr. Herring's men appeared with two large cases of tools, which had to be brought to the testing-house on a truck, and included a sledge hammer, with a head weighing about 20 lbs.; immense steel wedges, weighing nearly, if not quite, as much; a powerful screw frame, such as is used to punch holes in rails and to straighten them, weighing about two cwt.; a drilling frame, large enough to embrace the safe; and lever and crowbars five feet long, if not more; in all a mass of engineers' tools weighing between four and five cwt. The committee rejected the screw frame and some other large wedges, but the sledge hammer, crows, and drilling frame were allowed.

The question as to the relative value of the safes was not put in a satisfactory manner, and the conditions of the two were totally different, so that the committee will certainly have some difficulty in arriving at a satisfactory conclusion.

Mr. Herring's safe was about five feet high, but contained within it a small box of immense strength fixed to the bottom of the safe near the back. Mr. Chatwood's safe is about three feet high, without any inner box; both have double skins, the hollow being filled in with fire-proof composition.

The portion of the trial which touches the security of property against burglars is the one which interests the world, and though circumstances already referred to make the task very difficult, we shall try to separate, as far as possible, one phase of the trial from the other. And here it may be mentioned that as regards the time occupied in the various operations, it was taken for the committee by Mr. Walker, of London, whose own safe was forced by burglars some months ago, and who, chronometer in hand, watched the proceedings with natural interest.

The work began on the 13th instant, at 2.44 p.m. In 29 minutes the doors of Mr. Herring's safe were forced by means of small wedges, and flung wide open, and the whole of the drawers and shelves thrown out upon the floor, leaving nothing inside but the small box at the bottom already alluded to. During this same time, and up to 3.45, that is to say for one hour one minute, Mr. Herring's men had tried picks, the drilling frame with ratchet brace, taps, wedges, and punches or drifts with the sledge hammer, on the lock and door of Mr. Chatwood's safe, and were then compelled to give the task up as hopeless; the peculiar form of the closing edges preventing the introduction of the wedges, the brittle *spiegeleisen* enclosed between the double wrought iron sides of the safe breaking the drills, and causing them to fly about the testing house in the most dangerous manner, while the general strength of the safe resisted even the drift and sledge hammer. Had not the latter been used, the operations upon Mr. Chatwood's safe, save and except the noise made, were such as three burglars might have effected; but the door remained intact in spite of all, as did the small enclosed box in Mr. Herring's.

Foiled in their attempts in front, Mr. Herring's men began to operate on the side of Mr. Chatwood's safe with the immense steel wedges, crowbars, and sledge-hammers already alluded to, using, in addition, a large boiler-maker's set, that is to say, a strong steel cutting punch, with handle, struck by the sledge hammer, and they succeeded in making an entry; when this work commenced Mr. Chatwood claimed the sledge hammer also, which was of course immediately allowed, and his men set to work upon the solid door of the inclosed box at 7·26 o'clock. At 7·40 Chatwood's men had made a hole in the front of Herring's small box, and greatly shaken it, but the men were evidently fatigued; the light was nearly gone, so the work was stopped for the night. On the following morning the destruction of Herring's enclosed safe was completed in four minutes and a-half.

The recital of the latter portion of the experiments is only useful as exhibiting the admirable workmanship which the men had to destroy. We have already described the tools used; the men who wielded them were first-class workmen and foremen, some of them of Herculean strength, and the noise was so terrific that the public, unaware of what was going on in the testing house, were positively dismayed, and the police had some difficulty in maintaining order without; this will not surprise anyone when we state that the sledge-hammers were brought down upon the heads of sets and wedges five, six, and seven times in succession, without a halt, with a force and precision that astonished even engineers present. It should be added that the whole of the operations were watched by the members of the committee, some officers of the executive, a few members of the English press, and Mr. Walker the time keeper.

Fine Arts.

Artists' Exhibition.—There exist at Fontainebleau itself, and also in several villages in the forest, colonies of artists, of which Barbizon and Marlotte are the principal, and an inn in the former village has long been famous for the sketches left by artists on the walls of its various chambers. A notice has just appeared, to the effect that the artists have now established an exhibition of their own works in the same village, which is open gratuitously to the public from May till December.

Manufactures.

A Loom for Weaving Convex Work has been invented in New York, and is now being shown at the Paris Exhibition. Besides answering the purpose of the hand-loom, hitherto exclusively used, it possesses the advantage—which is absolutely necessary where labour is scarce—of doing ten times the amount of work in the same space of time. With the hand-loom, one man can make at the utmost four pair of stays a day; whereas the convex weaving machine turns out 40 pairs daily; they are, besides, more flexible than the hand-loom stays, and quite free from hard seams. This loom does the work automatically; the principle of a constant length of travel for the shuttle was adopted for the sake of simplicity; but but as it is necessary, in weaving the gores, that the weft thread should pass through only a part of the breadth of the warp, the jacquard has

been employed for the purpose of taking up the portion of the warp required to be woven in that part. As the shuttle passes over the full breadth of the warp, of which only one portion, say one-third, is to be used, it unwinds the full length of weft thread from the bobbin, but only one-third of it is tied in the warp. In repassing the shuttle one-third more is tied, thus leaving one-third of the unemployed weft thread in the form of a loop upon the article manufactured. To remove this superfluous thread, the thread-catcher, which is a lever with an elastic finger, passes from behind, through the lay on each side of the reed, and pulls the thread out. In consequence of this partial opening of the warp, the fly shuttle could not be used, and another contrivance had to be resorted to. This consists in a carrier, by which the shuttle is conveyed to the centre of the warp, where it is taken by the other carrier and passed through the warp. By these carriers a very even motion, free from all jerks, is imparted to the shuttle. The most difficult part of the work is performed by the regulator, or take-up motion, the action of which is to take up the woven cloth in such a manner as to leave a straight line in front of the reed. The material is woven first only on one side, then for the cases left for the whalebones, where the material must be double, evenly over the whole breadth, then on the other side only; and, finally, for the full breadth at the back and front of the stay, the motion must change accordingly. To effect this, the cloth passes between two sets of rollers, the upper of which are simple pressure rollers, to be regulated by springs and set-screws. The lower rollers are fluted, and worked by a system of levers independent of each other. The levers are worked conjointly by the jacquard, and lie so that the lay gives only a movement to those levers which have been previously acted upon by the jacquard. A very elastic warp tension is obtained by a peculiarly-constructed lever, combined with an elastic break, so as to render the machine fit for any work, flat or convex, plain or ornamented, according to the cards placed upon the jacquard and the material put in warp and shuttle.

Notes.

Honours to Men of Science, &c., in France.—Amongst the decorations bestowed on the occasion of the Imperial fêtes, we find the following:—M. Barreswil, chemist, elevated to the rank of Officer of the Legion of Honour; and the following manufacturers created Chevaliers of the same order:—MM. Bouillon, iron master; Brun-Faulqueir, stearine candle manufacturer, Montpelier; Gabriel Depaynin, director of coal mines; Durand, spinner, Flairac; Hayem, manufacturer, Paris; Husson, waterproof cloth maker, Paris; Joubert, sail-cloth maker, Angers; Charles Leroy, manufacturer, Gentilly; Eugene Laniel, manufacturer, Vimontiers; Gustave Lemaire, manufacturer, Bolbec; Isidore Leroy, paper hanging manufacturer, Paris; Méry-Samson, manufacturer, Lisieux; Testenoire, silk manufacturer, Lyons; Aubert, manufacturer, Elbeuf; Vivaux, iron master, Dammarie; Lévy, director of mines, Moselle; Doré, iron master, Mans; Durand, iron master, Dordogne.

Industrial Prizes. — The Society of Industrial Sciences of Lyons offers silver and bronze medals for memoirs on the following subjects, for the year 1868:—*Mechanics*—1. The most efficacious means of obtaining industrial furnaces, by a good disposition of all the parts, well arranged ventilation, economic combustion of fuel, and relative smoke-consuming power; 2. The means for controlling, measuring, and registering the motive power of machines, with the view of regulating the interests of proprietors and hirers of motive power. *Chemistry*—1. Introduction of a new chemical industry with the department of the Rhone; 2. Creation of a chemical process or improvement of one already known. *Silk Trades*—1. Construction of an improved power loom for weaving plain silks; 2. Application of a known motor of not more than two horse power nominal, and presenting the greatest simplicity and economy of installation, regularity, and economy in working, and other qualities necessary for its introduction into the weaving shops of Lyons. *Natural Sciences*—1. The best geological chart of one or more cantons of the Rhone; 2. Discovery, in the environs of Lyons, of a mineral substance applicable to the casting of metals, and especially of bronze, brass, &c.; 3. Explanation of the cause of the malady which attacks the silkworm, and means of prevention. *Commerce and Trade in General*—1. Introduction, with success, of a new industry in Lyons; 2. Project for the foundation of a superior school of commerce at Lyons.

Public Charity in Paris.—The Direction of Public Charity has just taken a census of the poor population of Paris, which gives the following results:—In 1863 the total of the indigent population of Paris was given officially at 40,056 families, comprising 101,570 individuals; last year the total had increased to 40,644 families and 105,119 individuals, the proportion being one person inscribed on the lists of relief for every 17·12 inhabitants; this includes only those whose names appear in the lists of the *bureaux de bienfaisance*, and who are in receipt of official relief. The richest *arrondisement*, that of the Elysée, has but one indigent person out of 53·65; the poorest, that of the quarter of the Observatory, one in 9·25; and that of Menilmontant, one in 12·60. It is stated that three-fourths of the indigent poor are not Parisians, but provincials, attracted to the capital by the increase in wages, without taking into account the corresponding increase in rent and the cost of living. The whole sum distributed is excessively small, amounting on an average only to 48f. 65c. per annum for each family, or 18f. 65c. to each individual relieved.

Agricultural Prizes in France.—The Paris Society for the Encouragement of Arts and Manufactures has just announced a series of new prizes in favour of agriculture. (1.) A prize of 6,000 francs, to be awarded in 1873, for steam cultivation. (2.) A prize of 3,000 francs, for 1872, for the invention and propagation of the best methods of reducing the cost of hand-labour in the getting in of cereals. (3.) A prize of 3,000 francs, session 1874, for the cultivation of land on the slopes of mountains. (4.) Two prizes of 3,000 and 2,000 francs for systems of irrigation, to be awarded in 1874. (5.) A prize of 2,000 francs, to be awarded in 1870, for the best account of the various processes of wine making in use in the different parts of France, their discussion and comparison, and the improvements of which they are susceptible. (6.) A prize of 3,000 francs, to be awarded in 1869, for the best apparatus or process, in practical use, for the preservation of wine, with a view to exportation as well as the home trade. (7.) A prize of 1,000 francs, to be given in 1871, for the best study of the agriculture and rural economy of a province or department. The Society of Agriculture of Clermont in the Oise, distributes its prizes in September, for long service and good conduct of agricultural labourers; for the good construction and manufacture of agricultural implements-machines, and tools; and to the most able workmen in the management, care, and repair of agricultural implements, including steam engines. This prize has been established on the proposition of M. Albaret, who says: "It often happens that an agricultural machine is received from a distant part of the country (from abroad perhaps) which will not work, but which an intelligent artizan would set to rights in a short time, and at very small cost; such a prize would assist in stimulating rural workmen, blacksmiths, farriers, and others, to study such machines, and enable them to repair them when accidents happened, and thus save the neighbourhood considerable loss in time as well as money." The establishment of such a prize is equally honorable to the proposer and

the society which has adopted the proposition, and offers an excellent example for imitation.

Foot Bridges over Crowded Streets.—It has long been proposed to throw foot bridges over the most crowded boulevards of Paris, and a plan for effecting this is now under the consideration of the authorities. The author of it proposes, by way of experiment, to erect a double foot bridge near the Boulevard Montmartre, where it is intersected by the Rue Montmartre and the Faubourg of the same name. The plan of the proposed bridge is nearly in the form of the letter X, that is to say, four flights of steps are to lead from the four corners of the footpaths to a central platform; each flight, however, is divided below into two branches, which being semi-circular, allow of a considerable elevation without overhanging the roadway. At the top of this compound staircase is a landing place, which is connected with the main platform by means of another short flight of steps. The proposed height of the platform above the road is about twenty-one feet. Executed in cast and wrought iron the estimate for this foot bridge is 50,000 francs (£2,000.)

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 13th August, 1867.

520. Metropolis Gas Bill—Special Report from the Select Committee.

Delivered on 14th August, 1867.

270. Bill—County General Assessment (Scotland) (amended).
279. ,, Railway Companies Relief.
312. ,, Poor Law Board, &c. (Lords' Amendments.)
313. ,, Royal Military Canal.
487. Caledonian Canal—Sixty-second Report of the Commissioners.

Delivered on 15th August, 1867.

308. Bill—Militia (England).
314. ,, Guarantee of Government Officers (Lords' Amendments).
315. ,, Dogs Regulation (Ireland) Act (1865) Amendment (Lords' Amendments).
316. ,, Canongate Annuity Tax (Edinburgh) (Lords' Amendments).
333. Public Accounts—First Report and Evidence.
431. (A II.) Poor Rates and Pauperism—Return (A) (June, 1866 and 1867).
498. Sasines (Scotland)—Return.
529. New Parishes and Church Building Acts, &c.—Returns.
535. Roach River Oyster Fishery—Mr. Pennell's Report.

Session 1866.

422. (C I.) Poor Rates and Pauperism—Return (C).

Delivered on 16th August, 1867.

303. Bill—Metropolitan Municipal Government.
317. ,, Banns of Matrimony (Lords' Amendments).
425. Special and Common Juries—Report and Evidence.
548. Western Australia—Extracts of Correspondence.
Public General Acts—Cap. 70 to 99.

Delivered on 17th August, 1867.

318. Bill—Increase of the Episcopate (Lords' Reasons).
524. Inland Revenue—Return.
525. Constabulary (Ireland)—Nominal List.
Public Petitions—Thirty-seventh Report.

Delivered on 19th August, 1867.

399. East London Water Bills, &c.—Report and Evidence.
407. Finance Accounts (1866-67), Parts I. to VII.
506. Gaols—Return.
Public General Acts—Cap. 100 to 104.

Patents.

From Commissioners of Patents' Journal, August 16th.

Grants of Provisional Protection.

Aërial apparatus—2229—J. E. Nelson.
Artificial fuel—2065—H. Fletcher.
Barley, drying—2095—J. Schofield and J. C. Dawson.
Bottles, securing contents of—1899—P. Smith.
Boxes for holding pieces of paper for use—2215—J. C. C. Azémar.
Brakes for cotton lappers or scutchers—2242—J. G. Tongue.
Capsules—2151—W. Betts.
Carding engines—2209—B. Dobson and W. Slater.
Cartridge pouches—2098—G. H. Daw.
Cast-iron, treating—2282—E. T. Hordley.
Coffee injectors—2250—J. F. and F. Fenton.
Compost, fertilizing—2198—A. Watt.
Condensers, self-acting—2077—J. Brière.
Electric light, production of the—2221—F. H. Holmes.
Fibrous substances, preparing—2219—F. A. Calvert.
Fire-arms—2216—C. E. Brooman.
Fire-arms—2228—W. Tranter.
Fire escapes, &c.—2069—J. Scott.
Food, preserving substances for—2238—J. Dewar.
Forge hammers—2240—W. Horton.
Furnaces—2264—J. Heaton.
Furnaces—2266—J. Lockwood.
Furnaces—2268—J. Bolland.
Gas from petroleum, &c.—2194—D. Hodge and R. C. Witty.
Hose, &c.—2224—J. Quin.
India-rubber thread cutting—2280—M. Hamer.
Kitchen ranges—2274—M. Jones.
Lamps—2199—J. B. A. Menage.
Lamps—2256—I. Angus.
Looms—2201—W. Gadd.
Looms—2211—M. J. Fearnley and C. Smith.
Malt liquors, raising to a higher level than that of the vessel in which they are kept—2081—J. Fleming.
Metallic ores, &c., grinding and pulverizing—1939—T. Borlase.
Miners' lamps—1908—C. C. Dubrulle.
Miners' safety-lamps—2230—S. Higgs.
Motive-power of water, steam, &c.—2278—F. C. Marshall and H. Stewart.
Needle cases and wrappers—2206—A. James.
Needle cases, &c.—2225—R. Newhall.
Petroleum, &c., burning—2196—B. F. Stevens.
Photographic apparatus—2170—C. Silvy.
Ploughs—2210—M. Puddefoot.
Printing consecutive numbers—2084—J. Fraser.
Projectiles—2190—A. M. Clark.
Rollers used in doubling cotton, &c.—2202—J. Haworth & E. Hamer.
Rollers, &c., with india-rubber surfaces—2232—J. Poole.
Rollers, &c., preparing moulds for the casting of—2286—C. Benson and J. Barker.
Rotary pumps—2246—R. Bewley.
Safety-box slides—1804—H. G. B. Röber.
Saws, &c., straightening and flattening—2248—J. Russell.
Seeds, &c., sorting, screening, and classifying—2272—H. H. Murdoch.
Ships, propelling and steering—2205—C. Mayo.
Ships, &c., composition for coating—2012—R. Smith.
Smoke, &c., condensing noxious—2212—J. M. Hocking.
Soda from chloride of sodium, &c., producing—2121—J. Hargreaves.
Spinning and doubling machines—2208—B. Dobson and J. Cocker.
Spinning and doubling machines—2244—J. and T. Elce.
Steam engines—2284—G. Holcroft and W. N. Dack.
Steam generators and condensers—2097—J. Slater.
Stoves, hot-blast—2182—H. Chamberlain.
Sugar, manufacturing—2213—G. Gordon.
Umbrellas—2220—J. H. Johnson.
Vessels and aërial conveyances by reaction, propelling—2223—R. B. Boyman.
Vessels, propelling, and pumping water—2254—W. W. Hughes.
Watch cases, &c.—2252—J. T. Hatfield.

Invention with Complete Specification Filed.

Blowers for furnaces, &c.—2324—B. F. Sturtevant.

Patents Sealed.

445. G. F. Redfern.
446. A. A. Fousset.
450. E. Brasier.
451. E. Brasier.
458. J. H. Johnson.
466. M. Henry.
467. W. S. Gamble.
471. H. Wadkin & C. Shepherd.
473. J. Robinson and J. Smith.
484. J. Harrison.
487. W. W. Urquhart and J. Lindsay.
498. H. Purnell.
511. J. Marshall.
515. W. Barrett.
523. E. Funnell.
535. A. Howat.
580. F. A. P. Vandeputte.
608. H. Ulliel.
622. G. H. Morgan.
642. W. E. Newton.
656. J. H. Johnson.
866. W. Clark.
1288. J. F. Collins.
1766. J. E. Boyce and R. Harrington.

From Commissioners of Patents' Journal, August 20th.

Patents Sealed.

236. W. Dickinson.
474. J. Weems & T. Robertson.
477. W. Riddell.
483. M. Walker, G. H. Money, and F. Little.
486. C. Colwell.
488. A. I. L. Gordon.
495. W. E. Heath.
499. A. Kinder & W. B. Kinsey.
500. W. Deakin & J. B. Johnson.
507. J. Bates.
509. C. E. Brooman.
510. G. Lüftringhaus.
516. J. Alison.
524. E. Hely.
529. J. Tatham.
538. J. Saxby and J. S. Farmer.
542. T. B. Kay and F. Hamilton.
558. A. McCallum.
559. A. B. Brown.
574. J. H. Johnson.
575. T. Berrens.
704. H. L. Corlett.
1110. J. Richardson & C. Greenwood.
1186. L. B. Bruen.
1227. J. Swinburne.
1269. E. B. Bigelow.
1826. A. M. Clark.

Patents on which the Stamp Duty of £50 has been Paid.

2019. W. Richardson.
2031. R. A. Brooman.
2044. W. Dalziel.
2061. F. G. Underhay and R. Heyworth.
2188. W. Clark.

Patents on which the Stamp Duty of £100 has been Paid.

1968. E. Wroughton & T. Holmes.
2016. M. Jacoby.
2047. W. Thomson & F. Jenkin.
2068. J. Bingley.

Journal of the Society of Arts.

FRIDAY, AUGUST 30, 1867.

Announcements by the Council.

Artizans' Visit to Paris.

Her Majesty's Government have granted to the Society of Arts, in aid of the fund now being raised by the Society for assisting workmen, specially selected from various trades, to visit and report on the Paris Exhibition, the sum of £500, conditional on the Society raising a like amount by public subscription.

The following is the list of subscriptions up to the present date :—

H.R.H. the Prince of Wales, President	£31	10	0
Her Majesty's Government (conditional)	500	0	0
Society of Arts	105	0	0
Earl Granville, K.G.	5	0	0
Lord de L'Isle	10	0	0
Thomas Twining	2	2	0
Sir J. P. Boileau, Bart.	5	0	0
George Godwin, F.R.S.	1	1	0
Vice-Chancellor Sir W. Page Wood, F.R.S.	10	0	0
Sir W. H. Bodkin (Assistant-Judge)	3	3	0
Sir Rowland Hill, K.C.B.	3	3	0
Benjamin Shaw	2	2	0
Alfred Davis	10	10	0
Eugène Rimmel	5	5	0
Frederick Mocatta	2	2	0
James Marshall	2	2	0
Robert Dawbarn	1	0	0
Henry Vaughan	10	10	0
Philip Sancton	5	0	0
Somerset A. Beaumont	5	0	0
Decimus Burton, F.R.S.	1	0	0
W. Botly	1	1	0
Professor Robert Bentley	2	2	0
John Stuart Mill, M.P.	1	1	0
G. F. Wilson, F.R.S.	2	2	0
Henry Creed	1	1	0
The Marquis of Salisbury, K.G.	10	0	0
D. Roberton Blaine	2	2	0
William Hawes	2	2	0
Seymour Teulon	1	1	0
G. N. Hooper	2	2	0
Lord Taunton	5	0	0
Henry Cole, C.B.	1	0	0
A. Robb	1	1	0
S. Andrews	1	1	0
Thomas Dixon	1	1	0
Charles Telford	1	1	0
Edmund Burke	2	0	0
W. H. Gore Langton, M.P.	5	0	0
J. R. Fowler	1	0	0
John Rutson	1	1	0
W. Fothergill Cooke	2	2	0
J. P. Gassiot, F.R.S.	5	5	0
The Duke of Devonshire	10	0	0
Messrs. Chawner and Co.	2	2	0
Chas. Brooke, F.R.S.	1	1	0
T. Chappell	2	2	0
C. Candy	2	0	0
Alfred Haines	2	2	0
Major-General Sir William Gordon, K.C.B.	2	2	0
Bartlett Hooper	2	2	0
Carry forward	£795	7	0

Brought forward	£795	7	0
F. Richardson	1	1	0
J. Sharples	3	3	0
Henry Johnson	2	2	0
C. Skipper, jun.	1	1	0
G. T. Saul	1	1	0
Alderman D. H. Stone	5	5	0
G. H. Walker	1	1	0
R. Worthington	2	2	0
A. W. Miles	2	2	0
J. Harris Heal	2	2	0
John Bell	1	0	0
Messrs. Mander and Co.	2	2	0
B. S. Cohen	1	1	0
John Corbett	1	1	0
J. Zaehnsdorf	0	10	6
Major-General Viscount Templetown, C.B.	5	0	0
J. Pearce	3	3	0
Messrs. Huntley and Palmer	2	2	0
A. Glendining, jun.	1	1	0
A. Trevelyan	2	2	0
S. Harrington	1	1	0
Montague Ainslie	2	2	0
James Bentley	2	2	0
Capt. R. P. Oldershaw	1	0	0
E. C. Tufnell	2	2	0
Samuel Redgrave	1	1	0
Joseph Lockett	2	2	0
Messrs. Spicer, Bros.	4	4	0
John Tolhurst	1	1	0
Lord Ebury	5	0	0
C. Lawson	1	0	0
John Horton	1	1	0
W. Baker	1	1	0
Henry Briggs	1	1	0
James Heather	1	1	0
H. Reader Lack	1	1	0
C. Silvy	1	1	0
William Browne	1	1	0
T. Kibble	1	1	0
C. Garland	1	1	0
Antonio Brady	2	2	0

Collected in response to a Circular issued by the Birmingham Chamber of Commerce.

G. Dixon, M.P., Birmingham	5	5	0
Messrs. Smith and Wright, Birmingham	5	5	0
Messrs. Griffiths and Browett, Birmingham	5	5	0
Henry Weiss, Birmingham	2	2	0
W. H. M. Blews, Birmingham	2	2	0
W. Middlemore, J.P., Birmingham	5	5	0
Thomas Lloyd, Birmingham	2	2	0
Messrs. Elkington and Mason, Birmingham	5	5	0
Messrs. John Hardman and Co., Birmingham	2	2	0
Messrs. F. and C. Osler, Birmingham	5	5	0
The Proprietors of the *Birmingham Journal and Daily Post*	2	2	0
The Proprietors of the *Birmingham Gazette*	2	2	0
R. L. Chance, Birmingham	2	2	0
T. Avery, Birmingham	2	2	0
W. Tonks and Sons, Birmingham	2	2	0
W. Lucas Sargant, Birmingham	2	2	0
— Mountain (Messrs. Walter, May, and Co.), Birmingham	2	2	0
J. A. Williams, Birmingham	2	2	0
Henry Charlton, Birmingham	2	2	0
W. Bartlett and Sons, Birmingham	5	0	0
John P. Turner, Birmingham	0	10	6
W. H. Avery, Birmingham	2	2	0
Messrs. Peyton and Peyton, Birmingham	3	3	0
James Cartland, Birmingham	2	2	0
Messrs. Smith and Chamberlain, Birmingham	2	2	0
Messrs. Baker and Son, Birmingham	2	2	0
Messrs. Hinks and Wells, Birmingham	2	2	0
Messrs. Van Wart and Co., Birmingham	5	0	0
Carry forward	£952	15	0

Brought forward	£952	15	0
Messrs. Evans and Askin, Birmingham ..	2	2	0
C. Shaw, Birmingham	2	2	0
James Barwell, Birmingham..	1	1	0
Messrs. Chance and Co., Birmingham ..	5	5	0
*Messrs. Ashford and Winder, Birmingham	10	0	0
*William Aston, Birmingham	10	0	0
*Messrs. Chance and Co., Birmingham (2nd donation)	5	5	0
*Messrs. Griffiths and Browett, Birmingham (2nd donation)	5	5	0
*Messrs. Peyton and Co., Birmingham (2nd donation)	2	2	0
Messrs. Gammon and Co., Birmingham ..	2	2	0
Messrs. Messengers and Co., Birmingham ..	5	5	0
Pemberton and Sons, Birmingham	2	2	0
Total	£1,005	6	0

Messrs. J. M. Johnson and Sons have kindly placed at the disposal of the Council a number of their five-shilling English Catalogues of the Exhibition, sufficient to present each workman with a copy.

Subscriptions may be forwarded to the Financial Officer, at the Society's House.

The Council are now prepared to receive the names of any workmen recommended by their respective trades as fit and proper persons to undertake this important duty on behalf of their fellow workmen. A certain number have already been selected, and some of them are now in Paris.

Prizes for Art-Workmen.*

The Council of the Society of Arts hereby offer Prizes for Art-Workmanship, according to the following conditions :—

I. The works to be executed will be the property of the producers, but will be retained for exhibition, in London and elsewhere, for such length of time as the Council may think desirable.

II. The exhibitors are required to state in each case the price at which their works may be sold, or, if sold previously to exhibition, at what price they would be willing to produce a copy.

III. The awards in each class will be made, and the sums specified in each class will be paid, provided the works be considered of sufficient merit to deserve the payment; and, further, in cases of extraordinary merit additional awards will be given, accompanied with the medal of the Society.

IV. Before the award of prizes is confirmed, the candidates must be prepared to execute some piece of work sufficient to satisfy the Council of their competency.

V. *Bona-fide* Art-workmen only can receive prizes.

VI. Although great care will be taken of articles sent for exhibition, the Council will not be responsible for any accident or damage of any kind occurring at any time.

VII. Prices may be attached to articles exhibited and sales made, and no charge will be made in respect of any such sales.

VIII. All the prizes are open to male and female competitors, and in addition, as regards Painting on Porcelain, Cameo-cutting, Engraving on Glass, Decorative Painting, and Wall Mosaics, a second set of prizes, of the same amounts, will be awarded among female competitors. If a female desire to compete in the female class only, she must declare her intention accordingly. The originals of the works prescribed may be seen at the South Kensington Museum.

IX. Any producer will be at liberty to exhibit, either in his own name or through his workmen, any work or works as specimens of good workmanship, in the various classes, provided that the work or works be accompanied with a statement of the name or names of the artizans who executed their respective portions; and if the work or works be sufficiently meritorious, extra prizes will be given to the artizans who have executed them.

X. Artizans may, if they think fit, exhibit works executed by them after other designs than those stated above, in any of the classes. Such works may contain the whole or portions of the prescribed designs, and must be of a similar style and character. Competitors must specify the class in which they exhibit. If the works be sufficiently meritorious extra prizes will be awarded.

XI. All articles for competition must be sent in to the Society's house on or before Saturday, the 21st of December, 1867, and must be delivered free of all charges. Each work sent in competition for a Prize must be marked with the Art-workman's name, or, if preferred, with a cypher, accompanied by a sealed envelope giving the name and address of the Art-workman. With the articles, a description for insertion in the catalogue should be sent. The works will be exhibited at the Society's House, and afterwards at the South Kensington Museum.

Casts may be seen at the Society of Arts, Adelphi, London, and the Schools of Art at Edinburgh, Dublin, Manchester, Glasgow, Birmingham, and Hanley in the Potteries.

Photographs and rough casts in metal, &c., may be purchased at the Society of Arts, John-street, Adelphi, at the prices named.

The plaster casts of the examples in classes 2 and 4 (except bas-relief 4*a*) may be obtained from Mr. Franchi, 15, Myddelton-street, Clerkenwell, E.C.; the other casts from Mr. D. Brucciani, Galleria delle Arti, 40, Russell-street, Covent-garden, W.C.

*** The Council are happy to announce that several of the works which received first prizes in the competitions of 1863, 1864, 1865, 1866, and 1867, have been purchased by the Department of Science and Art, to be exhibited in the South Kensington Museum and the Art Schools in the United Kingdom.

FIRST DIVISION.

Works to be Executed from Prescribed Designs.

For the successful rendering of the undermentioned designs in the various modes of workmanship according to the directions given in each case.

Class 1.—Carving in Marble, Stone, or Wood.

(*a.*) *The Human Figure.*—One prize of £15 for the best, and a second prize of £7 10s. for the next best, work executed in marble or stone, after part of a frieze of a chimney-piece, by *Donatello*, No. 5,795, in the South Kensington Museum; or a relievo in terra cotta, Amorini supporting an entablature; original in the South Kensington Museum, No. 11,940. Dimensions—Two-thirds the size of the cast (linear).—The design may be adhered to strictly or adapted to any architectural purpose.

[Cast—Fifteen Shillings; Photograph—One Shilling.]

(*b.*) *Ornament.*—One prize of £10 for the best, and a second prize of £5 for the next best work, executed in marble, stone, or wood after a carved chair-back in the South Kensington Museum. Dimensions—To be two-thirds of the cast (linear).

[Cast—Twelve Shillings. Photograph—One Shilling.]

* The Worshipful Company of Salters contribute £10 annually to this prize fund. The Worshipful Company of Clothworkers contribute £10 10s. to this prize fund. The Worshipful Company of Goldsmiths contribute £15 "for the encouragement of workmen in the precious metals." Particulars of the Goldsmiths' Company's prizes are given. The North London Exhibition prize consists of the interest of £167 7s. 3d., invested in the name of the Society of Arts, to be awarded by the Council "for the best specimens of skilled workmanship" at the Society's Exhibition of the works sent in for the prizes named above.

(*c.*) *Ornament.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed in stone, after a *Gothic bracket* in the Architectural Museum. Dimensions the same as the cast. In this design the details may be improved by the introduction of small animals, and the human head may be changed according to the taste of the art-workman.

[Cast—Ten Shillings; Photograph—One Shilling.]

(*d.*)—One prize of £20 for the best, and a second prize of £10 for the next best, work carved in *wood* after a panel in carved oak. Original in South Kensington Museum, No. 274. Dimensions—Optional.

[Photograph—Sixpence.]

(*e.*)—One prize of £15 for the best, and a second prize of £7 10s. for the next best, work carved in *wood* after the entablature of a chimney-piece carved in wood, in the South Kensington Museum, No. 85.'64. Dimensions—Same size as original.

[Photograph—One Shilling.]

(*f.*) *Ornament.*—One prize of £10 for the best, and a second prize of £5 for the next best, work carved in wood after an *Italian picture frame* in the possession of Henry Vaughan, Esq. Dimensions optional.—This design may be adhered to strictly or adapted in such manner as the workman may think fit.

[Photograph—Two Shillings.]

(*g.*) *Ornament carved and gilt.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed in wood, carved and gilt after a *Console Table* in the South Kensington Museum, No. 6,497, of the period of Louis XVI. The work to be carved roughly in wood, then to be prepared in the white by a gilder, then cut up or carved in the white by the carver, then to be gilt in mat and burnished gold. As such work may probably be executed by two persons, the prize will be apportioned as the judges may determine.

[Photograph—One Shilling.]

Class 2.—Repoussé Work in any Metal.

(*a.*) *The Human Figure as a bas-relief.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after the Martelli Bronze Mirror Case, No. 8,717, in the South Kensington Museum—dimensions, 6¾ inches diameter; or a panel in low relief, the Virgin and Child, in South Kensington Museum, No. 66.'66. Dimensions—One-third of original.

[Cast of Mirror Case—Two Shillings; Photograph—One Shilling. Cast of Bas-relief, 3s. 6d.

(*b.*) *Ornament.*—One prize of £5 for the best, and a second prize of £3 for the next best, work executed after a tazza in silver, date 1683, the property of Sir W. C. Trevelyan, Bart., now in the South Kensington Museum. Dimensions—The same as the model.

[Photograph—One Shilling.]

Class 3.—Hammered Work, in Iron, Brass, or Copper.

Ornament.—One prize of £7 10s. for the best, and a second prize of £5 for the next best, work executed after a knocker in wrought iron, in the South Kensington Museum, No. 9,007.

If the work is executed in brass or copper, it should be rendered subject to the conditions of these metals, either as split and riveted or partly beaten from the sheet, and the awards will be made in view of these conditions. The work must not be covered with colour or any coating which masks the workmanship.

[Photograph—One Shilling and Threepence.]

Class 4.—Carving in Ivory.

(*a.*) *Human Figure in the round.*—One prize of £15 for the best, and a second prize of £10 for the next best, work executed after an ivory plaque of Silenus and Amorini, by *Fiamingo*, No. 1,059, in the South Kensington Museum; dimensions—five inches greatest length; or after a relievo in marble, the Virgin and Child, No. 4,233 in the South Kensington Museum. Dimensions—To be reduced in height by one-third (linear).

[Cast of the Plaque—Two Shillings; and Photograph of the Virgin and Child—One Shilling each.]

(*b.*) *Ornament.*—One prize of £7 10s. for the best, and a second prize of £5 for the next best, work executed after an ivory crozier head, in the South Kensington Museum, No. 214.'65. Dimensions—The same as the cast.

[Cast—One Shilling.]

Class 5.—Chasing in Bronze.

(*a.*) *The Human Figure.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a panel in low relief, the Virgin and Child, in the South Kensington Museum, No. 66'66.

A rough casting in bronze, on which the chasing must be executed, will be supplied by the Society at cost price.

[Plaster Cast—Three Shillings and Sixpence.]

(*b.*) *Ornament.*—One prize of £10 for the best, and a second prize of £7 10s. for the next best, work executed after a silver gilt missal cover, in the South Kensington Museum, No. 2,639.

[Photograph—One Shilling.]

Class 6.—Etching and Engraving on Metal—Niello Work.

Prizes of the Goldsmiths' Company.

Ornament.—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after arabesques by Lucas Van Leyden, A.D. 1528. No. 18,968 in the South Kensington Museum. To be engraved the height of the photograph, and, if round a cup or goblet, repeated so as to be not less than nine inches in length when stretched out.

[Photograph—Sixpence.]

Class 7.—Enamel Painting on Copper or Gold.

(*a.*) *The Human Figure.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a panel in low relief, the Virgin and Child, in the South Kensington Museum, No. 66.'66. Ground to be blue. Dimensions—Half size of original.

[Photograph—One Shilling; Cast, Three Shillings and Sixpence.]

(*b.*) *Ornament.*—One prize of £5 for the best, and a second prize of £3 for the next best, work executed after the back of a plate, No. 8,428, in the South Kensington Museum. Ground to be blue. Dimensions—The same as the Photograph.

[Photograph—Sixpence.]

Class 8.—Painting on Porcelain.

(*a.*) *The Human Figure.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a photograph of a drawing by *Raphael*, No. 20 in the South Kensington Museum. Dimensions—The same as the Photograph. This work is to be coloured according to the taste of the painter.

[Photograph—Ninepence.]

(*b.*) *Ornament.*—One prize of £5 for the best, and a second prize of £3 for the next best, work executed after a photograph of ornament by *Aldegrever*, No. 2,118 in the South Kensington Museum, and coloured according to the taste of the painter, with a gold ground. Dimensions—Double the size of the Photograph (linear).

[Photograph—Sixpence.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, SectionVIII.

Class 9.—Decorative Painting.

(*a.*) *Ornament.*—One prize of £5, and a second prize of £3, for a work, executed after a photograph of ornament by *Aldegrever*, in the South Kensington Museum, No. 2,118. Dimensions—length, 3 feet.

[Photograph—One Shilling.]

(*b.*) *Ornament.*—One prize of £5, and a second prize of £3, for a work, executed after a *picture frame*, in the South Kensington Museum, No. 7,820. Dimensions—5 feet by 3 feet 11½ inches, outside measure. The works to be executed on canvass, either with or without stretchers, in cool colours. Some lines of the mouldings may be gilt.

[Photograph—One Shilling and Sixpence.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, SectionVIII.

Class 10.—Inlays in Wood (Marquetry, or Buhl), Ivory or Metal.

Ornament.—One prize of £5 for the best, and a second prize of £3 for the next best, work executed after a guitar inlaid with ivory, ebony, and mother-o'-pearl. The ornament to be of the same dimensions as the original, but may be applied to any object. No. 9,611 in the South Kensington Museum.

[Photograph—Sixpence.]

Class 11.—Cameo Cutting.

(*a.*) *Human Head.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a bust of *Clytie* in the British Museum—The head only.

[Cast of the Head—Five Shillings.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

Class 12.—Engraving on Glass.

Ornament.—One prize of £10 for the best, and a second prize of £3 for the next best, work executed after arabesques by Lucas Van Leyden, A.D. 1528. No. 18,968 in the South Kensington Museum. To be engraved the height of the engraving; and if round a glass or goblet, repeated so as not to be less than 9 inches long when stretched out.

[Photograph—Sixpence.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

Class 13.—Wall Mosaics.

Human Head.—One prize of £10 for the best, and a second prize of £7 10s. for the next best, work executed after a *Female Head* (over the lame cripple) in the cartoon of the "Beautiful Gate." The dimensions of the work should be regulated by the size of the tesseræ proposed to be used, which size may be left to the choice of the artist. Although desirable, it is not necessary to execute the whole subject in actual mosaic. The original is at the South Kensington Museum. Tesseræ of two sizes may be obtained from Messrs. Minton, Stoke-upon-Trent; Messrs. Maw and Co., Brosely, Shropshire; Messrs. Powell and Sons, Temple-street, Whitefriars; and Messrs. Jesse Rust and Co., Carlisle-street, Lambeth.

[Photograph—One Shilling.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

Class 14.—Gem Engraving.

(*a.*) *Human Head.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a cameo portrait of Savonarola, No. 7,541 in the South Kensington Museum. Dimensions—The same as the cast.

[Cast—Sixpence.]

(*b.*) *Full-length Figure.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a small Wedgwood medallion, No. 5,827 in the South Kensington Museum. Dimensions—The same as the cast.

[Cast—Sixpence.]

Class 15.—Die Sinking.

Human Head.—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a Wedgwood Medallion in the South Kensington Museum, No, 3,470. Dimensions—

[Photograph—Sixpence.]

Class 16.—Glass Blowing.

Ornament.—One prize of £7 10s. for the best, and a second prize of £5 for the next best, work executed after an original in the South Kensington Museum, No. 6,785. Dimensions—As given in the wood engraving.

[Photograph—Sixpence.]

Class 17.—Bookbinding.

(*a.*) *Bookbinding.*—One prize of £7 10s. for the best and a second prize of £5 for the next best, work executed in bookbinding, after a specimen in the South Kensington Museum, No. 164.'64. The work to be bound should be some classical author of the size given. Dimensions—The same as the photograph.

[Photograph—One Shilling.]

Class 18.—Embroidery.

Ornament.—One prize of £5 for the best, and a second prize of £3 for the next best, work executed, either after *Two Angels* in an example in the South Kensington Museum, No. 1194.'64, or an Italian Silk in the South Kensington Museum, No. 7,468, which may be adapted to a screen. Dimensions—According to the taste of the embroiderer.

[Photograph—German, Sixpence; Italian, One Shilling.]

Class 19.—Illuminations.

Ornament.—One prize of £5 for the best, and a second prize of £3 for the next best, copy made from an Altar Card, attributed to Giulio Clovio, in the South Kensington Museum, No. 2,958, or from a MS. border, date 1450, No. 3,057, in the South Kensington Museum. Dimensions—One-half larger than the Photograph (linear).

[Photograph—Two Shillings.]

SECOND DIVISION.

Class 20.—Wood Carving.

(*a.*) *Human figure in the round, in alto or in bas relief. Animals or natural foliage may be used as accessories.* 1st prize of £25 and the Society's Silver Medal. 2nd prize of £15. 3rd prize of £10.

(*b.*) *Animal or still-life. Fruit, flowers, or natural foliage may be used as accessories.* 1st prize of £10. 2nd prize of £7 10s. 3rd prize of £5.

(*c.*) *Natural foliage, fruit, or flowers, or conventional ornament, in which grotesque figures or animals may form accessories, preference being given where the work is of an applied character for ordinary decorative purposes, as representing commercial value.* 1st prize of £10. 2nd prize of £7 10s. 3rd prize of £5.

(By order)
P. LE NEVE FOSTER, *Secretary.*

Proceedings of Institutions.

Ryde Literary Institute.—The report for the past year says the balance sheet for last year showed a balance in hand of £12 4s. 9d.; the amount received since that time is £90 6s. 2d.; the amount of payments is £94 8s. 11d. There is, therefore, a deficiency on the year's account of £4 2s. 8d; thus the balance in hand of treasurer is reduced to £8 2s. The extra expenses of the year have been £15 15s. for catalogues, labels, and library shelves. Books to the value of about £8 have been purchased and added to the library during the past year. The names of 111 members are at present on the books. A new catalogue has been issued. The statement of accounts shows that the receipts have been £102 10s. 11d., and that there was a balance in hand of £8 2s.

South-Eastern Railway Mechanics' Institution.—The thirty-ninth report, being for the half-year ending March 31, 1867, congratulates the members on the present prosperous condition of the Institution. The present number of members is 280, which is the same as at the corresponding period last year. Sixty-eight volumes have been added to the library, which now contains 1,568 volumes. New catalogues have been prepared. Classes for instruction in arithmetic, writing, and spelling, for juniors and adults, French, vocal music, mechanical and free-hand drawing have been carried on during the whole of the half-year; they have been attended by upwards of a hundred of the members, and the teachers report very favourably of the progress of the pupils. The members have had the opportunity of attending all lectures and readings in connection with the Ashford Institution free of charge during the winter months. The financial statement shows a balance in hand of £37.

Wigan Mechanics' Institution.—The thirteenth annual report states that the career of the Institution has not been marked by any particular feature. The subscription for painting and cleaning the Hall, including £50 granted by the Public Hall Association, amounted to £72 13s. The balance of the cost has been paid by the Institution. Several entertainments given at the commencement of the winter entailed a loss to the Institution of upwards of £15. The library has been weeded by the sale of 700 volumes, which were found of no use to the Institution. The vacancy has to a certain extent been filled up by the purchase of 61 volumes of new works, and by presents. The number of books now in the library is 2,451; 1,204 more volumes have been taken out during the past year than the year previous. The number of members is 303, slightly less than in the previous year. At the Government examination of Science Schools in 1866, several candidates obtained prizes. The income was £574; and there is a balance against the Institution of about £47.

EXAMINATION PAPERS, 1867.

The following are the Examination papers set in the various subjects at the Final Examination held in April last:—

(*Continued from page* 624.)

ENGLISH LITERATURE.

THREE HOURS ALLOWED FOR THE TWO AUTHORS SELECTED BY THE CANDIDATE.

Shakespeare.

("Hamlet."—"Henry V."—"The Tempest.")

1. In what connexion does each of the following passages occur? Explain every allusion and remarkable expression:—

(*a.*) Since thou dost give me pains,
Let me remember thee what thou hast promised,
Which is not yet performed me.

(*b.*) The slave, a member of the country's peace,
Enjoys it; but in gross brain little wots
What watch the king keeps to maintain the peace,
Whose hours the peasant best advantages.

(*c.*) The single and peculiar life is bound,
With all the strength and armour of the mind,
To keep itself from 'noyance; but much more
That spirit, upon whose weal depend and rest
The lives of many.

(*d.*) For in the book of Numbers is it writ,—
When the man dies, let the inheritance
Descend unto the daughter.

(*e.*) We are such stuff
As dreams are made on, and our little life
Is rounded with a sleep—

(*f.*) I once did hold it, as our statists do,
A baseness to write fair, and laboured much
How to forget that learning—but, sir, now
It did me yeoman's service.

2. Explain the following words and expressions:—galliard, termagant, clepe, cerements, flote, eyases, espials, imposthume, "out-herod's Herod." "'a babbled of greenfields," "still vexed Bermoothes."

3. In what senses that have now become obsolete, were these words often used in Shakspeare's time:—*let, antic, crisp, sort, ecstasy, marches.*

II.

4. Compare Ariel with Caliban.

5. Sketch the plot of the second act of Hamlet.

6. In what respects has Shakspeare deviated from history in Henry V.? From what source did he take his main facts?

7. Describe the character of Hamlet's mother.

8. What do you know regarding the texts of Hamlet and Henry V.?

Milton.

("Paradise Lost," Books I. to VIII.)

1. In what connexion does each of the following passages occur? Explain the allusions and notice any remarkable expressions:—

(*a.*) The easier conquest now
Remains thee, aided by this host of friends,
Back on thy foes more glorious to return,
Than scorned thou didst depart.

(*b.*) Greater now in thy return
Than from the giant angels: thee that day
Thy thunders magnified; but to create
Is greater than created to destroy.

(*c.*) In solitude
What happiness? Who can enjoy alone;
Or, all enjoying, what contentment find.

(*d.*) As when by night the glass
Of Galileo, less assured, observes
Imagined lands and regions in the moon:
Or pilot, from amidst the Cyclades
Delos or Samos first appearing, kens
A cloudy spot.

(*e.*) The mind is its own place, and in itself
Can make a heaven of hell, a hell of heaven.
What matter where, if I be still the same
And what I should be—

2. Give an account of the allegory of Sin and Death, and illustrate it from Scripture.

3. As when from mountain tops the dusky clouds
Ascending, while the north wind sleeps, o'erspread
Heaven's cheerful face; the lowring element
Scowls o'er the darkened landscape snow, or
shower, &c.

In what connexion does this passage occur? What reflection on the conduct of human creatures follows? How far do you agree with the poet's sentiment?

II.

4. Mention, and quote if you can, any passages in the Paradise Lost in which Milton alludes to the circumstances of his own life and times.

5. Sketch the argument of the Second Book of the Paradise Lost.

6. What do you know of the circumstances connected with the writing and first publication of the Paradise Lost?

7. Briefly compare the Paradise Lost with any other great poem with which you may be acquainted.

8. Give a list of Milton's principal works.

Butler.

(The Analogy, Part I.)

1. What is the nature of analogical evidence?

2. Give an outline of Butler's argument from analogy in favour of a future state.

3. "There is in the nature of things, a tendency in virtue and vice to produce the good and bad effects now mentioned in a greater degree than they do in fact produce them." Explain this statement.

4. What would be the result if a perfectly virtuous community of men existed on the earth? How does this supposition illustrate Butler's argument?

5. "Now the beginning of life, considered as an education for mature age in this present world, appears plainly, at first sight, analogous to this our trial for a future one." Sketch the line of reasoning in which these words occur.

6. In what connexion are the words *moral* and *positive* opposed to each other?

7. Explain the terms *necessity* and *final cause*.

II.

8. Give a short analysis of the first part of the Analogy.

9. What do you know of the principal works the tendency of which the Analogy was intended to counteract?

10. Sketch the life of Butler.

Shaw.

(History of English Literature, Chaps. I., II., IV., V., to IX., XV., XX., XXII.)

1. Give an account of the way in which the Latin element of the English language has been brought in.

2. Sketch a life of Chaucer and give a list of his principal works.

3. What do you know of Southwell, Fairfax, Sir Philip Sydney, Lord Buckhurst.

4. Give some account of the Faery Queen.

5. What was the effect of the philosophical works of Lord Bacon upon the study of natural science?

6. In what way was the drama first developed in England?

7. Give a classified list of Shakspeare's plays.

8. Which are called "The Augustan Poets?" Why are they so called?

9. What do you know of the principal essayists of Queen Anne's time?

10. Sketch the life of your favourite modern poet, and name his chief poems.

LOGIC AND MENTAL SCIENCE.

THREE HOURS ALLOWED.

Moral Philosophy.

Smith's Theory of Moral Sentiments.

1. How do we judge of the propriety or the impropriety of the sentiments manifested by our fellow-men?

2. Analyse the sentiments of *amiability* and *respectability*.

3. Why is it a breach of propriety strongly to express our animal passions, and no breach of it to express the social passions to any degree we choose?

4. What is the origin of ambition?

5. On what ground does Adam Smith teach us that we regard an action as being worthy of reward or punishment?

6. Analyse the sense of merit and demerit.

7. Explain the principle of *self-approbation* by the law of sympathy.

8. How do you distinguish between the desire of praise and praise-worthiness, and between the hatred of blame and blame-worthiness?

9. How does Adam Smith evolve the sense of duty out of the law of sympathy?

10. How are the general rules of morality formed, and what is their especial value and authority?

Logic of Induction.

Mill's Logic.

1. Explain the difference between reasoning *inductively* and reasoning *deductively*.

2. In investigating any branch of physical science the facts of the case have to be carefully collected. Distinguish between such a collegation of facts and induction properly so called.

3. Whately says that all inductions are syllogisms with the major premiss suppressed. Is this true? If so, what is the major premiss when supplied, and on what basis does it rest?

4. Distinguish between *laws of nature* and particular instances of them. Give examples of both.

5. How does Mill state the law of causation, and on what evidence does he consider it to rest?

6. What is meant by the composition of causes? Does it always follow the analogy of the composition of forces?

7. State and explain Mill's four methods of experimental inquiry.

8. What is an hypothesis? When is it legitimate, and what is its proper use?

9. What is Mill's explanation of the word *chance?* Is there any ground for a calculation of chances? What is it?

Formal Logic.

1. Which of our intellectual powers are independent of any aid from *language*, and which of them can only be properly developed by the co-operation of language? Give reasons for your conclusions on this point.

2. What is the difference between abstraction and generalisation? What names do you give to the result of these faculties—first, when only conceived in the mind; secondly, when stated in words?

3. Can logic tell us whether any single proposition is true or false? If so, why? If not, why not?

4. What is meant by the extension and comprehension of a term? How are extension and comprehension related to each other?

5. Explain the doctrine of the *predicables*, and give a complete classification of all possible predicates.

6. Give the rules for a correct logical division and definition. How are these rules often violated in common life?

7. What is meant by the *quality* and what by the *quantity* of a proposition? What simplifications have been proposed in formal logic, through properly marking the quantity of the predicate?

8. There are six general rules of the syllogism. State and justify them.

9. What is an enthymeme? Put the following examples into a complete syllogism, stating the mood and figure:—

a. Ireland is distressed, therefore it is misgoverned.

b. The Epicureans cannot be considered true philosophers, because they did not consider virtue to be essentially good.

10. What is an epicherema? Expand the following into two or more separate syllogisms:—Every thing, the knowledge of which is obtained by intuition, is true, because upon such intuitions all reasoning and all knowledge are based. But our mental identity is a fact, which we know by intuition, since the belief of it is immediate, irresistible, universal; it, therefore, must be grounded in truth.

11. How may fallacies be classified? What names would you give to the following?

a. No evil should be allowed that good may come; but all punishment is an evil, so that no punishment should be allowed that good may come.

b. Leaving off animal food has greatly improved his health, for he has never experienced a headache since.

Mental Philosophy.

Sir W. Hamilton's Lectures.

1. What general classification of mental phenomena was adopted by Hamilton, and how did he *sub-divide* the intellectual powers? Show the precise function of each of the faculties enumerated under the latter.

2. Hamilton speaks of our knowledge in *perception* being regarded by some writers as mediate, by others as immediate. To what theories of perception does he refer, and what different forms have these theories assumed?

3. What is meant by natural realism, and what by cosmothetic idealism? On what grounds has the former been denied?

4. Prove by facts that sensation and perception are in the inverse ratio to each other.

5. Is visual distance a simple perception? What is Berkeley's theory on this point, and on what grounds did he maintain it?

6. What does Hamilton mean by "latent thought?" Give the facts of the case, and what they are intended to account for?

7. What difference does Hamilton draw between the *retention* and the *reproduction* of our ideas? State the laws of reproduction.

8. Give a brief account of Hamilton's views respecting the nature and province of imagination.

(To be continued.)

PARIS EXHIBITION.

The committee entrusted with the task of watching the proceedings, and deciding on the relative merits of the English and American safes, have resigned their functions. If this act had merely resulted from the inherent difficulties of the case, and from the departure from the terms of the original agreement, no one who watched the proceedings, or has carefully read the report, should be surprised; but when it has arisen from a different cause, and one which we feel a delicacy in touching upon, and we shall only say, therefore, that, in consequence of an improper proceeding of one of the parties interested, the president of the committee resigned his office, and the other members immediately refused to proceed further. As regards the English public, and especially those who are interested in the safe custody of valuables, the trial has clearly shown that Mr. Chatwood's safe is proof against any of the means at the disposal of burglars.

Few objects in the Exhibition have wider or a deeper interest than the specimens of cheap houses, or apartments for working men and their families; some remarks on what is being done under this head in Paris appeared in the notes of the "Society's Visit to Paris," in last week's *Journal*, and a few particulars respecting the efforts of the Mulhouse and other societies will help to complete the case. The Mulhouse Société des Cités Ouvrières was formed in 1853, with a capital of 300,000 francs, since increased to 355,000 (£14,200), its object being to put workmen in possession of houses of their own, by payment running over a certain number of years. The whole of the shares, each of the value of 5,000 francs, are held by twenty-one persons. At the outset of the society, the Duc de Persigny, then Minister of the Interior, obtained from the Government a grant of 300,000 francs, to be employed by the Company in creating establishments of public utility, and it was employed in building a large restaurant, a bakery, baths and washhouses, an asylum, broad streets bordered with trees, fountains, sewers, &c., and the Company undertook, on receipt of this subvention, to abandon its profits, to sell its houses and grounds at cost price, only to pay its shareholders 4 per cent. per annum, and to expend at least £36,000 in building houses. The first houses were erected in the year 1854, and the total number constructed to the end last year was 800. For some time all the houses have been built in groups of four, after two plans, that is to say, on one or two floors, each having a cellar and loft of the whole size of the house, and a private garden. The houses on two stories contain a large room on the ground floor, which may, if necessary, be divided in two, a kitchen and two rooms upstairs; those on one floor have two rooms, and a chamber if required in the loft. The ground covered by each house and garden averages about 200 square yards, and is enclosed by wooden palings. The rise in the price of materials has lately caused an increase in the cost of the houses—those on one floor costing at present £106, and those with an upper floor £132 to £136. The workmen who purchase the houses are allowed fifteen years to pay for them, but they have to pay down a sum varying from £8 to £12, according to the value, and to pay, moreover, 5 per cent. on the outlay. The payments are required to be made monthly, at the rate of 16s. to 20s. per month, and this only exceeds the ordinary rent of inferior houses in the same locality by five shillings to six shillings per month. The number of houses sold varies extremely—in 1856 the number was only five; in 1857 it was 110; and since that period it has ranged from 19 to 100; the sales this year have already amounted to 55, or more than the average. The payments are made with great regularity, and are often pre-dated to save the interest on the capital. An equitable arrangement is made when the purchaser cannot complete his bargain, and no instance of forfeiture has occurred; and of 645 houses sold previous to 30th June, 1866, 200 have been completely paid for. The total sum received by the Company, without counting the 5 per cent. interest, is more than £50,500. These results are highly satisfactory, and the Company continues to build from 50 to 60 new houses annually.

It is an interesting fact that more than twenty of the houses sold have been purchased for their parents by young soldiers out of the bounty paid to voluntary recruits; it is equally satisfactory to know that the possession of a comfortable house weans the Mulhouse *ouvriers* from the wine shop.

The restaurant and the bakery sell their productions at cost price, so that the bread is considerably cheaper there than elsewhere. A meal of soup, meat and vegetables costs 35 centimes (3½d.). Clothing, groceries, and other necessaries are also sold as cheaply as possible, but always for cash. The charges at the baths and washhouses are, for a comfortable bath, with towels, 15 centimes, and for two hours washing, and the use of the hot-air stove, 5 centimes, or one halfpenny. The asylum is capable of receiving 250 to 300 children between the ages of three and six years, and there are two large primary schools near the *Cités ouvrières*.

One large house is composed of furnished apartments for bachelors, who have each a nicely-furnished room for 5s. 5d. per month.

One condition is insisted on by the Company, namely,

that every one who buys or hires a house in the *cité* shall send his children to school; and annual prizes are awarded to those who distinguish themselves in the education of children, in the care of their houses and gardens, and in general order and economy. A large free library is established in the *cité*, and the number of books taken out last year exceeded 70,000. The population amounts to 5,500 souls.

The total outlay of the Company for ground and buildings to the present time is stated to amount to 2,400,000 francs (£96,000), and the payments of the purchasers now greatly exceeded the amount of the loans contracted by the Company, which amount to about £40,000.

One source of profit to the Company is the sale of plots of ground amidst the *cités ouvrières* for the establishment of spinning and weaving mills, the tract of land purchased by the Company being large and formerly of small value. These particulars are derived from an official report signed by M. Jean Dollfus and three other administrators of the *cités ouvrières*, as well as by M. Emile Muller, their architect.

The next most important experiment of the same kind has been made by the Company of the collieries of Blanzy, in the department of the Seine and Loire, which employs 3,500 men, and has built 679 houses, on a plan closely resembling that of the Mulhouse Company; it has also let or sold plots of ground for 99 other houses, erected by the men themselves. Each habitation consists of three rooms, and has a garden attached. The cost of each house, land included, is given at 2,200 francs (£88), and the rent is 54 francs a year, or about three-halfpence a day.

In the model house erected in the grounds of the Exhibition will be found a fine collection of the minerals of Blanzy, and other interesting matters.

The old water-works of Marly, those created by order of Louis XIV., to supply the palace and fountains of Versailles, were once almost numbered amongst the wonders of the world, but no vestige of these has been in existence for many years; models of them, however, are preserved in the *Conservatoires des Arts et Metiers* of Paris. The machinery was reconstructed between the years 1811 and 1826; but that now in operation was only decided on in 1854, and is not yet quite finished.

The old machine was the work of the Baron de Ville, engineer, and a clever carpenter of Liege, named Pennequin, and consisted of fourteen large wheels with vertical pumps, which lifted the water from the river to a first reservoir, sixty other pumps then raised the water from the first to a second reservoir, and a third set of pumps raised it again to the top of a tower erected at the head of the great acqueduct. The number of pumps was two hundred, and the connecting apparatus was of the most complicated and primitive description, making far more noise than work, so much so that with water power estimated at from 1,000 to 1,200 horse power, the machinery never raised more than 5,000 tons in the 24 hours, and lastly fell off to 2,000 tons.

The new machine has six water wheels, and when completed—only five are yet in work—is calculated to left 15,000 to 16,000 in the 24 hours to an elevation of more than five hundred, spread over a distance of about 7,500 feet. The machinery consists of vertical water-wheels, each of which has four horizontal pumps, worked by cranks on the axis of the wheels. Each of the wheels is 40 feet in diameter, and nearly 15 feet in width. A nicely executed model and series of plans and sections, together with full details of the new machinery and its capabilities, will be found in a small building in the park, not far from the model houses above referred to.

The comparative dryness of the soil of Paris, and the very small quantity of vegetable mould which lies on the stony strata, makes it very difficult to keep grass in good condition, and recourse is had to several ingenious methods of watering, the most simple being the use of pipes, attached to a hydrant, and pierced with a few rough holes in their sides; the pressure being considerable, the water is forced through these jagged holes in the form of fine spray, or, as it is curiously enough called here, in powder. A modification of his method has recently attracted considerable attention in the exhibition grounds; the nozzle of a water pipe is held up by a small frame, and attached to it by a joint is a small curved piece of pipe which revolves by the force of the water as it issues through the pipe; the consequence is that the water is flung over the grass in the finest form possible; the effect of the rays of the sun upon this artificial mist is very curious. Another and highly important application of this extreme subdivision of water is now under experiment here, namely, the construction of a steam engine without any boiler, the steam being produced instantaneously in the furnace. We have not yet seen this machine, which is the invention of M. Pascal, of Lyons, assisted by M. Savial du Fay, engineer in the Imperial navy, and which was examined the other day by the Emperor in one of the courts of the *Mobilier de la Couronne*, Quay d'Orsay.

Manufactures.

A New Act on Equitable Councils.—The Act to establish equitable councils of conciliation to adjust differences between masters and workmen has just been printed. After reciting the 5th of George IV., c. 96, and the other Acts to amend the same, it declares that in order the better to facilitate the settlement of disputes between masters and workmen, it is expedient, without repealing the several Acts, that masters and workmen should be enabled, when licensed by her Majesty, to form equitable councils of conciliation or arbitration, and that the powers of the Acts for enforcing awards made under or by virtue of the provisions should be extended to the enforcing the awards to be made by and under the authority of such equitable councils of conciliation. The mode of procedure is for a number of masters and workmen in a locality to call a meeting, and agree to form a council of conciliation and arbitration, and to petition her Majesty or the Secretary of State to grant a licence, which may be done after notice in the newspapers. A council is not to consist of less than two nor more than ten masters and workmen and a chairman, and the petitioners for a licence are to proceed to the appointment of a council from among themselves within thirty days after such grant of licence, and the council is to remain in office until the appointment of a new council in its stead. The council is to have power to determine questions submitted to it, and to enforce its awards, as mentioned in the first recited Act, by an application to a magistrate, by distress, sale, or imprisonment. No council under the Act is to establish a rate of wages or price of labour or workmanship at which the workmen shall in future be paid. A committee of conciliation is to be appointed by a council. "No counsel, solicitors, or attorneys to be allowed to attend on any hearing before the council or committee of conciliation unless consented to by both parties." Householders and part occupiers may demand to be registered and to have a vote for the council, and may be elected thereto. A registry is to be kept, and the masters and workmen are to elect the council. The forms to be used in carrying out the Act, and to enforce the awards of the councils on the questions "submitted to them by both parties," appear in the Act.

Commerce.

Cotton in South Carolina.—Mr. H. P. Walker, Her Majesty's Consul at Charleston, in a despatch addressed to Lord Stanley, remarks on the probable results of the operations of the agriculturists of South

Carolina during the present year. On a former occasion (he says) I ventured to predict that the exports of cotton from Charleston for the year to end on the 31st of August would not exceed 150,000 bales. The business of the season may now be considered as closed; very little more is likely to come during the three remaining months of the year, and the quantity is exactly in accordance with my preconceived views. At the present moment the inhabitants are exerting themselves to the utmost of their ability to produce another crop. They are, however, suffering most grievously from famine; it has driven very many of their number away; many negroes have been induced to go to Florida, some to Africa, and many others to South Western States. On the other hand, there has been no influx to take the place of the emigrants. The effect of the famine has also become apparent in the impaired strength of the animal power usually kept and used by the agriculturists in their proper pursuits. I have made particular inquiry of the progress of the farmer in the interior, and I am sorry to be again compelled to draw unfavourable conclusions. In short, I am obliged to predict that his present operations will not promote the prosperity of former years. To place this port in its former position, it is necessary to supply it with 550,000 bales of cotton for export. The current year has given it 150,000, and the agriculturists of the interior must be asked for the remaining 400,000. The response will be, the war has ruined us. Our negroes have gone away; want of means precludes us from offering to others sufficient inducements to contract with us, and we have not the necessary mules and horses to carry the ploughs we would desire to run. And then, again, they will say, our crop last year perished during the summer drought, and having no food for ourselves, we cannot possibly provide for retainers. But the same system which caused the present terrible famine is still persevered in, and must necessarily sooner or later drive from the land much of its labour power. The negro being a free man, the planter leaves him to provide for himself, and thinks only of the cotton which his labour is to produce, and the returns to be obtained for it. In former times the master was more keenly alive to the responsibility that was on him to provide food for his slaves; now, having no slaves, that responsibility is removed; he plants cereals only for his own immediate use; he plants cotton for such returns as will pay the expenses of the farm, and furnish the planter with such income as his sense of comfort requires. But the inevitable result of this system is a recurring famine and a still further depleting of the population. For when the want of corn is general, to supply it to every household throughout an extensive area is quite impossible. The number of plantations in the State, I have no doubt, is very much greater than during the last year; but the aggregate of negroes employed, I am equally sure, is very much less. Yet I am not disposed to think that the production of the State will be less; for allowance ought to be made for the industry and zeal of the cotton planter; and I believe that the heavy supplies of guano, that by some means or other the planters have managed to secure, will occasion a production sufficient in this year to counterbalance the loss to be sustained by the diminution of labour. I conclude, therefore, that the section of country which is tributary to this port will, for the ensuing year, furnish to her for export a quantity of cotton corresponding very closely with the amount furnished during the current year; but that the plan of operations is erroneous, and must tend to the gradual diminution of the labour of the country, and to the consequent cessation to the same extent of agricultural operations. But, in addition to this great impediment to the prosperity of the agriculturist, it should be borne in mind that the high prices which must be paid for every article of use or consumption are more than corresponding with the increased rat he obtains for his agricultural products. These high prices are occasioned by an inflated currency and by the imposition of taxes, so general in their application as to reach almost every conceivable thing. But even this is not all, for a still further tax of two cents and a half per pound must be paid on all the cotton of the ensuing season. In short, the planter meets with so much discouragement, that the wonder is he possesses the courage to persevere in so hazardous an enterprise as that to which his talents, capital, and life are directed.

British India.—A blue-book of 72 pages has just been issued, which may probably be regarded as the first of an annual series—a *Statistical Abstract* relating to British India. It describes British India as having an area of 955,238 square miles, and a population estimated at 144,674,615; native States an area of 596,790 square miles, and a population of 17,909,199; States under French Government 188 square miles, and 203,887 inhabitants; States under the Portuguese Government 1,066 square miles, and 313,216 inhabitants—making a grand total of 1,553,282 square miles, with a population of 193,100,963. The population of Calcutta, according to the census of January, 1866, was 377,924; of the town of Bombay, according to the census of February, 1864, 816,562; of the town of Madras, according to the administrative report for 1863,427,771. The commercial progress of British India of late years has been astonishing. In the financial year 1840-41 the merchandise imported by sea from foreign countries was of the value of £8,415,940; in 1860-61 it had risen to £23,493,716; in 1864-65 it was £28,150,923; in addition to £21,363,352 of treasure. In the year 1848-49 cotton goods of the value of £2,222,089 were imported into British India; in the year 1864-65 of the value of £11,035,885. The exports of merchandise from British India increased from £13,455,584 in the year 1840-41 to £32,970,605 in 1860-61, and to £68,027,016 in 1864-65. This last increase was, of course, due chiefly to the effect of the American civil war; in the year 1859-60 the export of raw cotton from British India amounted in value to £5,637,624, in 1864-65 to £37,573,637. The other chief exports in 1864-65 were:—Opium, £9,911,804; rice, £5,573.537; seeds, £1,912,433; indigo, £1,860,141; jute, £1,307,844. The United Kingdom took £7,054,388 worth of the exports in 1840-41, and £46,873,208 in 1864-65. Exports of the value of £10,874,652 in the last year went to China and Japan, and £2,902,596 to France. The entrances and clearances of British vessels in that year at ports of British India amounted together to 10,911 vessels, of 5,417,521 tons; of European and other foreign vessels 1,755, of 920,532 tons; of native craft, 40,277, of 1,582,864 tons. In the year 1864-65, 2,747 miles of railway were opened in India, and conveyed 12,826,518 passengers. There were 1,421 post-offices, and 55,986,646 covers were transmitted through the post, besides books and psrcels. 17,117 schools and colleges were maintained or aided by the Government; the average attendance of pupils in them was 435,898, and the Government expenditure upon them £391,277. £4,473,263 was expended in the year upon public works. 11,736 miles of government telegraph lines were open. The gross public revenue of British India increased from £20,124,038 in the financial year 1839-40, to £45,652,897 in 1864-65; and the expenditure from £22,228,011 in the former year to £46,450,990 in the latter. The public debt advanced from £34,484,997 in 1839-40, to £98,477,555 in 1864-65. The troops employed in British India in the former year were 34,604 Europeans and 199,839 natives; in 1864-65, 71,880 Europeans and 118,315 natives.

Colonies.

Export of Gold from Victoria.—The total amount of gold exported from the colony since the beginning of the year is 681,410 ozs., of which 76,725 ozs. were

from New Zealand. During the corresponding period of last year the quantity exported was 656,871 ozs., of which 121,393 ozs. were from New Zealand.

Revenue of New South Wales.—The Customs' revenue at this port continues to decrease, and, with the exception of November last, the receipts for last month were smaller than for any similar period since the commencement of 1866. The receipts for the month ending 31st ultimo were as follows:—Brandy, £8,710 4s. 4d.; gin, £4,100 17s. 4d.; liqueurs, cordials, or strong waters, £70 14s. 3d.; whisky, £1,028 13s. 7d.; rum, £10,553 10s. 1d.; perfumed spirits, £102 14s. 10d.; all other spirits, £545 7s. 10d.; wine, £1,854 14s. 10d.; ale, porter, and beer, in wood, £1,139 3s.; ditto, in bottle, £625 4s.; tobacco and snuff, £4,343 11s.; ditto, unmanufactured, £979 18s.; cigars, £503 3s. 11d.; tea, £4,332 16s. 8d.; coffee and chicory, £589 1s. 10d.; sugar, refined, £99 16s. 4d.; unrefined, £5,385 14s. 6d.; dried fruits, £499 7s. 8d.; hops, £28 14s. 6d.; malt, £38; rice, £1,181 8s. 11d.; gold, £18 14s. 2d.; opium, £819 16s. 3d.; bonding warehouse duty, £275 5s.; pilotage, £493 3s. 4d.; dues, £48 12s.; ad valorem, £3,851 12s. 10d.; package charge, £2,612 9s.—Total, £54,841 10s. The receipts during the corresponding month of last year were £75,308; there is therefore a comparative decrease in the month of £20,467. Taking the whole of the receipts, during the first five months of this year, we find that they are £25,615 less than those of the same period of 1866; the amounts being—first five months of 1866, £337,958; ditto of 1867, £312,343. The following table will show each month's receipts during the periods referred to:—

	1866.	1867.
January	£68,140	£77,875
February	64,267	66,916
March	64,491	55,073
April	65,752	57,638
May	75,308	54,841
	£337,958	£312,343

The yield of the new gold-fields at Emu Creek has caused the escort returns for last month to show a gratifying increase on the preceding months of this year. The quantity received from the various gold-fields during May amounted to 19,549 oz., of which 14,550 oz. was from the Western mines, 3,439 from the Southern, and 1,560 from the Northern. During the month of May, 1866, the receipts were—Western, 11,948 oz.; Southern, 8,095; Northern, 1,566. On comparing the two periods, it will be seen that there is an increase of 2,602 oz. in the receipts from the Western, but a decrease of 5,656 oz. in the Southern, and of only 6 oz. in the Northern. The gross receipts from January 1st to the 31st ultimo, amounted to 78,838 oz., as against 95,038 oz. received during the corresponding period of last year—a decrease of 19,200 oz. The following table shows the quantities of gold received by the various escorts during the four months of 1866 and 1867:—

1866.	Western.	Southern.	Northern.
January	9,464	7,131	1,338
February	9,363	7,255	1,543
March	8,355	7,346	2,413
April	11,559	5,975	1,687
May	11,948	8,095	1,566
	50,689	35,802	8,547
1867.			
January	8,325	2,670	2,334
February	8,210	5,849	1,124
March	8,941	5,698	2,127
April	9,311	3,474	1,226
May	14,550	3,439	1,560
	49,337	21,130	8,731

As in some cases large amounts have been recently brought down by private hands, it is becoming more difficult to arrive at the real yield of our gold-fields.

Wine in Australia.—We *(Observer)* need hardly say that the Customs' laws of Victoria are a real grievance to our vignerons. The duty of 3s. a gallon is prohibitive of all but our highest-class wines. This is, perhaps, not an unmixed evil. It prevents our manufacturers sending any but their best wines, so that the Victorians see our highest samples. Still the evil is a great one, and all the greater because the same law does not apply to the wines of New South Wales. We have to contend against a protective duty almost equal to the original value of the article. And it says much for the excellence of our productions, that notwithstanding this they have taken and retain a high position amongst our neighbours. There are gentlemen in Victoria who are exceedingly anxious to see this vexatious restriction abolished, that for the sake of their own colony they might be able to import our superior wines at moderate prices. And we can only indulge the hope that before long some means may be found to place our vignerons in a fairer position, and that they who have sunk so much capital and spent so much anxious labour in wine making may have the Victorian market open to them. There is not a more useful work to which our Government could address themselves than this. Free trade in native wines with Melbourne would be of incalculable advantage to us just now, when most of our interests are in a languishing condition. The total value of our wines which entered Victoria in 1866 was only £2,262. Now, if the duty were removed, this amount could easily be increased tenfold, and new life would be put into the trade in this colony.

Agricultural Statistics of New South Wales.—The following statistics are compiled from the *Statistical Register* for 1865:—The number of occupiers of land (exclusive of those for pastoral purposes) is 22,509; of these 13,818 were freeholders, and 8,691 leaseholders. The extent of their holdings is estimated at 7,277,255 acres, of which 4,590,406 acres were freeholds, and 2,686,849 acres leaseholds. There are 381,400 acres under general cultivation; 131,653 acres with wheat crops; 113,442 acres with maize; 5,843 acres with barley; 10,939 acres with oats; 15,290 acres with potatoes; 61,909 acres with hay. The cultivation of cotton has fallen off, only 11 acres have been cultivated, yielding 380lbs. The culture of tobacco extends over 1,499 acres, producing 7,469 cwt. of the weed. Upwards of 141 acres have been taken up for the cultivation of the sugar-cane, and last year produced 5,700lbs. The acreage for green food for cattle is 21,252; and for market-gardens and orchards 10,492 acres. Upwards of 2,126 acres are taken up for vineyards. The quantity of wine produced last year was 168,123 gallons; brandy, 1,439 gallons; besides upwards of 559 tons of grapes taken for table use.

Steam Traffic on the Murray.—As the time is now approaching for the resumption of traffic on the great inland streams, the steamers engaged in the Murray, Murrumbidgee, and Darling are making active preparations for a busy season, and, should the much wished for rainfall be propitious, they will shortly be engaged between the different towns on the Riverina. The advantage derivable to the vast tracts of country from these steamers is unquestionable, as they afford great facilities for the transmission of wool from the inland pastoral districts, and also for the carriage of stores to the different stations in the interior. The disadvantages against which they have to contend is considerable, arising from droughts which keep the river low, and also from the snags in the river. The tonnage of the fleet employed in this trade is over 2,000 tons, and gives employment to a great number of hands. There are over 30 steamers employed in this trade, averaging in size from 20 to 120 tons. Some of these steamers are are entirely built of iron, but the greater proportion are wooden vessels. Besides the boats above mentioned, there are others which trade from Adelaide to the Darling and Murrumbidgee without coming up to Echuca. For

the convenience of steamers calling at Echuca, a splendid wharf has been built, alongside of which runs the Victorian line of railway, on which a large traffic is done in the wool season. Great complaints are made about the crane accommodation at this wharf; there are at present two only, an 8 ton and a 5 ton. A large and increasing amount of machinery is being transported by way of Echuca to Riverina every year, and a powerful crane would be of great service in facilitating its shipment. As feeders to the Victorian Railways these steamers perform a prominent part, and if the charges for the conveyance of produce from Echuca to Melbourne by rail could only be fixed so as to bear a proportion to the charges by water, a greatly increased traffic would result. At present the steamers take great quantities of wool to Gooliva, from whence, after a short transit, it can be brought by the sea to Melbourne at a cheaper rate than if forwarded by rail from Echuca. The principal route for the forwarding of wool to Melbourne is certainly by Echuca, but when there comes to be a difference of £2 per ton in the carriage, it is hardly to be wondered at, that settlers prefer the slower though cheaper mode of transit. It is to be regretted that the railway does not command the great bulk of that traffic for which it was originally constructed.

Sydney Agricultural Exhibition. — The annual exhibition of the Agricultural Society was held in the government domain at Paramatta, on the 24th and 25th May, which was on the whole a decided success, most of the exhibits being very superior. The show of pigs and poultry was very good, and there were also some very fine samples of colonial wines and other products exhibited. The show of fruit was small, and chiefly confined to oranges. There was an excellent collection of farming implements, buggies, and miscellaneous articles. Among the agricultural products were some samples of maizena and arrowroot, which were particularly good. The cultivation of maize and arrowroot for the purpose of producing these articles in large quantities will no doubt turn out a very remunerative speculation.

Wheat in Melbourne.—Wheat has been sown under favourable circumstances, and a great breadth of land is now under that crop, but owing to the present low price of grain there is no chance of cereal crops paying unless the yield is large, so our farmers are every year giving more attention to grass, dairy, and sheep farming. Wheat has been low ever since harvest, but the demand for export has been steady, and the quantity sent away has greatly relieved the market. There is not an agricultural district which has not a large surplus this year; and judging by the extent of land already sown, it will be the same next year if the coming season is at all prolific. Stock is in fine condition, the grass having been good ever since last spring, and it is long since a winter has been commenced under better prospects than the present.

Obituary.

Professor Faraday.—The members will hear with sincere regret of the death of Professor Faraday, which took place on Sunday, the 18th inst., near Hampton-court. Michael Faraday was born in 1791, in the parish of Newington, Surrey, and, like many others who have illustrated the page of British history, was entirely a self-made man. After being instructed in the mere rudiments of knowledge, he was apprenticed to a bookseller and bookbinder, and continued to work at his trade till 1812. During this early period of his life, however, he showed the bent of his genius, for, in the intervals of his employment, he not only read with avidity such works on science as fell in his way, but applied himself to the construction of electric and other machines. Having been present at some of the last lectures delivered by Sir H. Davy, Faraday wrote to that distinguished chemist—asking him for encouragement, and at the same time inclosing notes of the lectures at which he had been present. Sir H. Davy answered the request of the young aspirant promptly and kindly, and in 1813 he was admitted in the Royal Institution as chemical assistant to Professor Brande. Faraday soon became the favourite pupil and the friend of his patron, whom he accompanied in the autumn of the same year in a visit to France, Italy, Switzerland, &c., returning to his place in the Royal Institution in 1815. He now pursued his investigations of nature with great ardour, and published the results in various scientific journals. In 1820 he discovered the chlorides of carbon, and the year following the mutual rotation of a magnetic pole and an electric current; in 1823 the discovery of the condensation of gases; in 1831 and following years the development of the induction of electric currents, and the evolution of electricity from magnetism. The establishment of the principle of definite electrolytic action, the discovery of diamagnetism, and the influence of magnetism upon light, obtained for him, in 1846, the Rumford medal, and that of the Royal Society. In 1847 he announced to the world the magnetic character of oxygen, and the magnetic relations of flame and gases. When Mr. Fuller founded the chair of chemistry, in the Royal Institution, in 1833, Mr. Faraday was appointed first professor. In 1835 he received a pension of £300 a year from Lord Melbourne's Government, in recognition of his important services to science. In the following year he was appointed scientific adviser on lights to the Trinity House, and was subsequently nominated to a similar post under the Board of Trade. He was chemical lecturer from 1829 to 1842 to the cadets at the Royal Military Academy at Woolwich. In 1823 he was made a corresponding member of the Academy of Sciences in Paris; in 1825 he was elected a Fellow of the Royal Society; and in 1832 the honorary degree of Doctor of Civil Laws was conferred on him by the University of Oxford. He was a Knight of the Prussian Order of Merit, of the Italian Order of St. Maurice and Lazarus, and one of the Eight Foreign Associates of the Imperial Academy of Sciences of Paris. In 1855 he was nominated an officer of the Legion of Honour, and in 1863 he was made an associate of the Paris Academy of Medicine. He was elected a member of the Society of Arts in 1819, and took an active part in the proceedings of its committees. In 1866 he received the Albert Gold Medal of the Society for "his discoveries in electricity, magnetism, and chemistry, which, in their application to the industries of the world, have largely promoted Arts, Manufactures, and Commerce." Although the late Professor chiefly confined himself to experimental researches, there are theoretical views thrown out with regard to static induction, atmospheric electricity, the lines of force, both representative and physical, which are well worthy of consideration. His papers on the conservation of force, and on the division of gold and other metals are amongst his latest productions. His lectures adapted for young minds, delivered at the Royal Institution during Christmas time, will not easily be forgotten. The ease with which he descended from the heights of science, and conveyed in the minds of his youthful listeners the scientific principles of "common things," was not the least of the many gifts possessed by Dr. Faraday. But it is in connection with electricity, and its relations with almost all physical, chemical, and physiological phenomena that his fame will principally depend. His investigations on this subject led him to the presumption that electricity, magnetism, and light are but one and the same force, varying in effect according to circumstances, but obedient to laws which will one day be discovered.

Publications Issued.

The Fouling and Corrosion of Iron Ships: their causes and means of protection, with the mode of appli-

cation to the existing iron-clads. By Charles F. T. Young, C.E. One vol., octavo. The fouling and corrosion of iron ships is still a problem unsolved. The author has made researches into the subject, and his book goes into its history, from early times down to the present. The author believes, as the result of his investigation, that the method of Mr. Daft, by means of zinc sheathing, as described by Mr. S. J. Mackie in his paper read before the Society during the last session, is in all respects "the soundest, the simplest, and most practical, and from being arranged in accordance with the known laws of nature, most certain of success." The work contains 212 pp., with seven wood engravings and two lithographs.

Notes.

Fresh Honours to Men of Science, &c., in France.—M. Claude Bernard, member of the Institut, and professor at the College of France, has been made Commander of the Legion of Honour. MM. Bertrand, D'Archiac, Delaunay, Hernute, members of the Institut; Bertholet, professor at the College of France; Abria, Dean of the Faculty of Science at Bordeaux; Béclard, member of the Academy of Medicine; Dr. Caffe, of the scientific press; De Chaumont, director of the Institut des Provinces; and Aubergier, Dean of the Faculty of Sciences of Clermont, promoted to the grade of Officers; and MM. Trécul, of the Institut; Fouqué, author of a work on the eruptions of Etna, and Santorin and Simonin, writers on scientific subjects, Chevaliers.

Professional Female Education in France.—Amongst the many excellent establishments which have been set on foot during the last few years in Paris is the *Société Lemonnier*, for the professional education of girls, presided over by the wives of several well known statesmen, M. Jules Simon amongst the number, and other ladies. The society is only four years old, but it possesses two schools, one having two hundred and the other nearly one hundred pupils. The mornings are devoted to general instruction and the application of science to the common wants of life, and the afternoons to professional study, such as book-keeping, and other commercial pursuits, drawing, engraving on wood, porcelain painting, making up clothes, linen, &c. Three engravings by pupils of the school were admitted to the last annual exhibition of pictures in Paris, and the collection of the school has now a silver medal from the jury of the International Exhibition. The school is unconnected with any sect, and, consequently, there is no question raised respecting the religion of the pupils or their parents; the catechism is replaced by simple moral lessons; there is a large library attached to each school, principally the result of donations from authors and publishers.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb. *Delivered on 20th August*, 1867.

486. Sasines (Scotland)—Return.
505. Civil Contingencies Fund—Accounts.
528. Terminable Annuities—Treasury Warrant.
542. Dogs Regulation (Ireland) Act (1866)—Return.
Public General Acts—Cap. 105.

Delivered on 21st August, 1867.

517. Railway, &c., Bills—Return.
527. Income and Property Tax—Returns.
Statistical Abstract for the United Kingdom from 1852 to 1866.

Patents.

From Commissioners of Patents' Journal, August 23rd.

Grants of Provisional Protection.

Athletic exercises, apparatus employed in—2265—W. Prangley.
Boats—2287—H. W. Withers.
Brushes—2090—H. A. Bonneville.
Cartridges and fire-arms—2277—A. J. Paterson.
Chimney tops—2297—C. Hohgrefe.
Cloth, apparatus for sinking—2281—T. S. Cressey and J. Webb.
Coprolites, washing—2316—J. J. Rawlings and H. Wilkerson.
Dredging machines—2279—R. H. Michell.
Felting machines—2255—W. Wilson.
Fire-arms, breech-loading—2263—G. Schneider.
Fires, extinguishing—2200—J. Jones.
Fires, igniting—2188—W. L. L. Leaver and A. Smalley.
Flour, manufacturing—2291—T. J. Baker.
Gas and air (combined) engines—2245—C. D. Abel.
Glass, &c., moulding designs in—2257—L. V. Hue and C. Rozière.
Harrows—2251—W. R. Grace.
Hop, manufacturing extract and essence of—2132—T. A. Breithauph.
Hydraulic lifts—2236—J. H. Johnson.
Knives and forks—2295—W. J. Miller.
Letter-stamping machines—2288—F. Wirth.
Looms—2302—G. Hodgson.
Looms—2306—R. Edmondson.
Medicines, dispensing, preparing drugs, &c.—2239—E. A. Kirby.
Metallic alloy—2285—A. M. Clark.
Metals, removing impurities from—2308—C. D. Abel.
Metals, &c., preserving the surfaces of—1113—R. Alexander.
Motive-power—2289—J. E. F. Lüdeke.
Nails, manufacturing cut—2296—R. Heathfield.
Paper bags—2283—J. P. Binns.
Paper, waterproof—2267—T. Whittaker and M. Rourke.
Peat, &c., preparing—2233—F. L. H. Danchell.
Printing presses—2290—W. R. Lake.
Pulleys for window frames—2273—F. Ryland.
Railway points and signals—2234—J. Edwards.
Reeds for weaving—2269—A. M. Clark.
Sarsaparilla, &c., splitting and cutting—2310—E. Courtin.
Sewing machines—2275—E. Cornely.
Slate, &c., machine for cutting—2177—W. E. Gedge.
Steam engines, marine—2003—J. M. Gray.
Steam generators—2312—J. H. Evers.
Steam, &c., indicating and registering the pressure of—2249—A. Budenberg.
Stringed instruments—2298—H. A. Bonneville.
Sugar, clarifying—2237—E. T. Marler.
Sulphuric acid—2259—W. J. Pughsley.
Telegraph cables—2241—T. Allan.
Telegraphs—2207—S. M. Martin and S. A. Varley.
Textile fabrics, &c.—2243—J. Smith.
Trenails—2271—E. J. W. Parnacott.
Twine or cord box—2293—F. J. Seymour.
Valves—2300—J. Davenport and J. Kilson.
Water-closets, &c.—2253—G. W. Dinsdale.
Windows, apparatus for cleaning—2304—G. Warsop.
Wood, reducing to shreds, to be used in the manufacture of paper pulp—2261—C. de Negri.

Inventions with Complete Specifications Filed.

Casks, cleaning—2345—J. Peacock.
Vessels, propelling—2352—H. Bodart and A. Sigodart.

Patents Sealed.

513. J. and J. Cash.
514. J. C. R. Weguelin and B. Hirst.
518. G. Daws.
527. C. Martin.
534. F. V. Wight.
543. J. McLintock.
547. J. Livesey, J. Edwards, and W. Jeffreys.
548. M. Mackay.
551. A. McDougall.
563. A. A. Croll.
592. A. C. Laurys.
603. J. W. Lewis and G. Archbold.
653. C. Mather.
827. G. Haseltine.
918. J. Howard & E.T.Bousfield.

From Commissioners of Patents' Journal, August 27th.

Patents Sealed.

555. S. Shore.
556. A. G. Chalus.
557. J. Piddington.
561. E. T. Hughes.
562. J. Buhrer.
565. J. Harbert & F. Goodman.
566. J. Bellerby.
573. J. C. Broadbent.
578. B. Sheard.
583. M. Gossi.
615. G. Withy & J. F. Cotterell.
626. E. Storey.
636. I. Dimock and J. Gresham.
665. T. S. Turnbull.
694. D. Nicoll.
871. G. Davies.
942. J. E. Ward.
1064. J. H. Player.
1527. A. Martin.
1875. W. E. Newton.

Patents on which the Stamp Duty of £50 has been Paid.

2137. J. Stenhouse.
2235. A. C. Kirk.
2269. C. Attwood.
2277. R. Chrimes.
2113. G. Haseltine.
2246. G. Haseltine.
2665. R. A. Brooman.
2089. E. T. Bellhouse and W. J. Dorning.
2095. R. Beard and W. Downing.
2088. A. A. L. P. Cochrane.
2126. J. Lones.

Patents on which the Stamp Duty of £100 has been Paid.

2039. S. Greenwood.
2190. G. Wellman.
2271. G. Owen.
2033. J. H. C. Lacroisade.
2055. R. Jobson & R. J. Ransome.
2063. G. T. Bousfield.

Journal of the Society of Arts.

FRIDAY, SEPTEMBER 6, 1867.

Announcements by the Council.

ARTIZANS' VISITS TO PARIS.

Her Majesty's Government have granted to the Society of Arts, in aid of the fund now being raised by the Society for assisting workmen, specially selected from various trades, to visit and report on the Paris Exhibition, the sum of £500, conditional on the Society raising a like amount by public subscription.

The following is the list of subscriptions up to the present date :—

H.R.H. THE PRINCE OF WALES, President	£31	10	0
HER MAJESTY'S GOVERNMENT (conditional)	500	0	0
Society of Arts	105	0	0
Earl Granville, K.G.	5	0	0
Lord de L'Isle	10	0	0
Thomas Twining	2	2	0
Sir J. P. Boileau, Bart.	5	0	0
George Godwin, F.R.S.	1	1	0
Vice-Chancellor Sir W. Page Wood, F.R.S.	10	0	0
Sir W. H. Bodkin (Assistant-Judge)	3	3	0
Sir Rowland Hill, K.C.B.	3	3	0
Benjamin Shaw	2	2	0
Alfred Davis	10	10	0
Eugène Rimmel	5	5	0
Frederick Mocatta	2	2	0
James Marshall	2	2	0
Robert Dawbarn	1	0	0
Henry Vaughan	10	10	0
Philip Sancton	5	0	0
Somerset A. Beaumont	5	0	0
Decimus Burton, F.R.S.	1	0	0
W. Botly	1	1	0
Professor Robert Bentley	2	2	0
John Stuart Mill, M.P.	1	1	0
G. F. Wilson, F.R.S.	2	2	0
Henry Creed	1	1	0
The Marquis of Salisbury, K.G.	10	0	0
D. Roberton Blaine	2	2	0
William Hawes	2	2	0
Seymour Teulon	1	1	0
G. N. Hooper	2	2	0
Lord Taunton	5	0	0
Henry Cole, C.B.	1	0	0
A. Robb	1	1	0
S. Andrews	1	1	0
Thomas Dixon	1	1	0
Charles Telford	1	1	0
Edmund Burke	2	0	0
W. H. Gore Langton, M.P.	5	0	0
J. R. Fowler	1	0	0
John Rutson	1	1	0
W. Fothergill Cooke	2	2	0
J. P. Gassiot, F.R.S.	5	5	0
The Duke of Devonshire	10	0	0
Messrs. Chawner and Co.	2	2	0
Chas. Brooke, F.R.S.	1	1	0
T. Chappell	2	2	0
C. Candy	2	0	0
Alfred Haines	2	2	0
Major-General Sir William Gordon, K.C.B.	2	2	0
Bartlett Hooper	2	2	0
Carry forward	£795	7	0

Brought forward	£795	7	0
F. Richardson	1	1	0
J. Sharples	3	3	0
Henry Johnson	2	2	0
C. Skipper, jun.	1	1	0
G. T. Saul	1	1	0
Alderman D. H. Stone	5	5	0
G. H. Walker	1	1	0
R. Worthington	2	2	0
A. W. Miles	2	2	0
J. Harris Heal	2	2	0
John Bell	1	0	0
Messrs. Mander and Co.	2	2	0
B. S. Cohen	1	1	0
John Corbett	1	1	0
J. Zaehnsdorf	0	10	6
Major-General Viscount Templetown, C.B.	5	0	0
J. Pearce	3	3	0
Messrs. Huntley and Palmer	2	2	0
A. Glendining, jun.	1	1	0
A. Trevelyan	2	2	0
S. Harrington	1	1	0
Montague Ainslie	2	2	0
James Bentley	2	2	0
Capt. R. P. Oldershaw	1	0	0
E. C. Tufnell	2	2	0
Samuel Redgrave	1	1	0
Joseph Lockett	2	2	0
Messrs. Spicer, Bros.	4	4	0
John Tolhurst	1	1	0
Lord Ebury	5	0	0
C. Lawson	1	0	0
John Horton	1	1	0
W. Baker	1	1	0
Henry Briggs	1	1	0
James Heather	1	1	0
H. Reader Lack	1	1	0
C. Silvy	1	1	0
William Browne	1	1	0
T. Kibble	1	1	0
C. Garland	1	1	0
Antonio Brady	2	2	0
S. Jackson	1	1	0
John Murray	2	2	0
Messrs. J. and P. Coates, Paisley	5	0	0
Messrs. Wm. Denny and Bros., Dumbarton	5	5	0

Collected in response to a Circular issued by the Birmingham Chamber of Commerce.

G. Dixon, M.P., Birmingham	5	5	0
Messrs. Smith and Wright, Birmingham	5	5	0
Messrs. Griffiths and Browett, Birmingham	5	5	0
Henry Weiss, Birmingham	2	2	0
W. H. M. Blews, Birmingham	2	2	0
W. Middlemore, J.P., Birmingham	5	5	0
Thomas Lloyd, Birmingham	2	2	0
Messrs. Elkington and Mason, Birmingham	5	5	0
Messrs. John Hardman and Co., Birmingham	2	2	0
Messrs. F. and C. Osler, Birmingham	5	5	0
The Proprietors of the *Birmingham Journal and Daily Post*	2	2	0
The Proprietors of the *Birmingham Gazette*	2	2	0
R. L. Chance, Birmingham	2	2	0
T. Avery, Birmingham	2	2	0
W. Tonks and Sons, Birmingham	2	2	0
W. Lucas Sargant, Birmingham	2	2	0
— Mountain (Messrs. Walter, May, and Co.), Birmingham	2	2	0
J. A. Williams, Birmingham	2	2	0
Henry Charlton, Birmingham	2	2	0
W. Bartlett and Sons, Birmingham	5	0	0
John P. Turner, Birmingham	0	10	6
W. H. Avery, Birmingham	2	2	0
Messrs. Peyton and Peyton, Birmingham	3	3	0
James Cartland, Birmingham	2	2	0
Carry forward	£954	17	0

	£	s.	d.
Brought forward	954	17	0
Messrs. Smith and Chamberlain, Birmingham	2	2	0
Messrs. Baker and Son, Birmingham ..	2	2	0
Messrs. Hinks and Wells, Birmingham ..	2	2	0
Messrs. Van Wart and Co., Birmingham ..	5	0	0
Messrs. Evans and Askin, Birmingham ..	2	2	0
C. Shaw, Birmingham	2	2	0
James Barwell, Birmingham..	1	1	0
Messrs. Chance and Co., Birmingham ..	5	5	0
*Messrs. Ashford and Winder, Birmingham	10	0	0
*William Aston, Birmingham	10	0	0
*Messrs. Chance and Co., Birmingham (2nd donation)	5	5	0
*Messrs. Griffiths and Browett, Birmingham (2nd donation)	5	5	0
*Messrs. Peyton and Co., Birmingham (2nd donation)	2	2	0
Messrs. Gammon and Co., Birmingham ..	2	2	0
Messrs. Messengers and Co., Birmingham ..	5	5	0
Pemberton and Sons, Birmingham	2	2	0
Total	£1,018	14	0

Subscriptions may be forwarded to the Financial Officer, at the Society's House.

The following workmen have already been selected, and many of them are now in Paris:—

Name.	Trade.
Connolly, Thomas	Mason.
Lucraft, B.	Chairs and sofas.
Whiteing, Geo	Grainer and decorator.
Kay, Alexr.....	Joiner.
McEwen, J.....	Mason.
Forbes, G. B.	,,
Whiteing, Richd.	(Special reporter.)
Green, Aaron	Decorator.
Beardmore, Wm.	Potter.
Hooper, C. A.....	Cabinet maker.
Blunt, Walter.....	Leather worker.
Walker, Wm.	Woodworking machinery.
Wilkie, Thos.	,, ,,
Booth, Laurence.....	Ribbon weaving.
Gutteridge, Joseph....	,,
Gregory, John.....	Watch trade.
Stringer, James	,,
Stanton, George	Horticulturist.
Bird, Joseph	Lace trade.
Dexter, George	,,
Smith, Edward	,,
Kendall, George.....	Hosiery trade.
Caunt, Geo.....	,,
Wilson, John	Cutlery.
Bramhall, Wm.	Saw maker.
Cooper, Samuel	Floor and wall tiles and pavements.
Coningsby, R.....	Engineer.
Evans, J.....	,,
Rosmüssen, P. A.	Silversmith.
Sinclair, R.	Tailor.
Bourne, W.....	Foreman, india-rubber works.
Letheren, W.	Art metal workman.
Winstanley, T. W.....	Architectural metal worker
Prior, J. D.....	Carpenter.
Mondy, E. F.	Shipwright.
Jeffery, J.....	Bricklayer.
Hughes, J. W.	Joiner.
Elliott, W.	Die-sinker.
Howell, G.	Bricklayer.
Bentley, J.	Ivory carver.
Berry, G.	Engraver.
Barrett, R.	Silver chaser.
Kirchoff, F.....	Glass painter.
Jacob, T.....	Cabinet draughtsman.
Page, G.	Silversmith.
Mackie, J.	Wood carver.
Baker, R.....	,,
Genth, L.....	Bookbinder.
Randall, J.	China painter.
Oats, Francis	Mining.
Jung, H.	Watchmaker.
Sent from Birmingham.	
Taylor, J.....	Gas-fitting, chandeliers, and lamps.
Bayley, Thomas	Plumbers' brass foundry.
Gorman, William	Cabinet ,, &c.
Dry, Henry.....	General ,,
Fowler, Henry	Labour-saving machines.
Clay, John	Saddles and bridles.
Thompson, Frederick..	Harness and leather work.
Plampin, James	Jewellery and gilt toys.
Johnson, Thomas	Buttons.
Bridges, Wm.	Buttons, metal caps, tools, and metal ornaments.
Hibbs, Charles.....	Guns, &c.
Sargeant, David	Papier-maché, &c.
Archer, Thos.	Japanning.
Guise, Wm.	Needles and fish-hooks.
Pearsall, Richd.	Glass for glazing purposes, plate glass, &c.
Swene, W. S.	,, (fancy.)
Wilkinson, T. J., ...	,, (practical manipula-
Moore, Chas. W.	Die-sinking.
Poole, Edwin	Tinplate-working.
Whitehouse, Benj.....	Railway carriage building.
Jackson, F.	General ornament.
Deeley, W. J.	Jewellery, with diamonds and precious stones.
Fellows, Henry	Electro-plate and plated wares.
Petit, J. L.	Steel pens.
Ansell, James	Church and other bells.
Fisher, John	Gas and other tubes.
Dodd, J.	Chandeliers and gas-fittings.

M. Haussoullier, the officer in charge of the British Workmen's Hall at the Paris Exhibition, and of the arrangements for affording all kinds of facilities, reports that upwards of 1,700 artizans used the Hall in the month of August, and that visits were made, generally by parties of about five artizans each, to 161 workshops of different kinds. Some artizans visited more than one workshop. M. Haussoullier adds, "The men sent by the Society of Arts are by far the most intelligent upon the whole, and are most anxious in their inquiries upon the *conditions économiques et morales* of the French artizans."

Messrs. J. M. Johnson and Sons have kindly placed at the disposal of the Council a number of their five-shilling English Catalogues of the Exhibition, sufficient to present each workman with a copy.

Proceedings of Institutions.

WHITBY INSTITUTE.—The report for last year, being the twenty-first, records a serious decrease in the number of members, and a lessening of the income of the society, This decrease has not, however, taken place to any marked extent amongst the yearly members; but the shorter-period members have fallen off greatly. The jet exhibition, to which a donation of £5 was given by the Society of Arts, was most successful. No less than £62 15s. was given in prizes. The goods shown far surpassed, both in number and taste, those of former years, and the attendance of visitors was larger than

heretofore. The exhibition was opened by the Marchioness of Normanby, and in the distribution of prizes the Marquis of Normanby presided. During the winter months a series of penny readings was instituted, which succeeded admirably. The attendance was always good, and generally the room was crowded to excess. In a pecuniary sense, also, the readings were of some advantage to the Institute, as they left a profit of £9 17s. 7d. An arrangement was made for the drawing class to meet three evenings in each week, instead of one. The charge for admission to the class was fixed at the moderate sum of fourpence per week, and the attendance increased largely, the total number of pupils reaching 54, several of whom had been students in former years; and one pleasing character of the class was the increased attendance of youths engaged in the jet trade, and for their special benefit a class for original designing was commenced. Still further to encourage this useful class, Mrs. Thomas Bagnall has offered £4, to be given in prizes, for the best designs for jet articles. The general instruction class was conducted, as before, and, in addition to these, a chemical class was carried on for a part of the winter season.

EXAMINATION PAPERS, 1867.

The following are the Examination papers set in the various subjects at the Final Examination held in April last:—

(*Continued from page* 639.)

LATIN AND ROMAN HISTORY.

THREE HOURS ALLOWED.

SECTION I.

Translate:—

Parcus deorum cultor et infrequens,
Insanientis dum sapientiae
Consultus erro, nunc retrorsum
Vela dare atque iterare cursus

Cogor relictos: namque Diespiter,
Igni corusco nubila dividens
Plerumque, per purum tonantes
Egit equos volucremque currum,

Quo bruta tellus et vaga flumina,
Quo Styx et invisi horrida Taenari
Sedes Atlanteusque finis
Concutitur. Valet ima summis

Mutare, et insignem attenuat deus,
Obscura promens; hinc apicem rapax
Fortuna cum stridore acuto
Sustulit, hic posuisse gaudet.

—*Hor: Carm: I.* 34.

1. Parse fully, giving both accidence and syntax, the words sapientiæ, iterare, quo, concutitur, summis, posuisse.

2. Give the present and perfect tenses indicative and the supines of the verbs dare, egit, promens, sustulit, gaudet.

SECTION II.

Translate:—

Nunc est bibendum, nunc pede libero
Pulsanda tellus, nunc Saliaribus
Ornare pulvinar deorum
Tempus erat dapibus, sodales.

Antehac nefas depromere Caecubum
Cellis avitis, dum Capitolio
Regina dementes ruinas
Funus et imperio parabat

Contaminato cum grege turpium
Morbo virorum, quidlibet impotens
Sperare fortunaque dulci
Ebria. Sed minuit furorem

Vix una sospes navis ab ignibus,
Mentemque lymphatam Mareotico
Redegit in veros timores
Caesar, ab Italia volantem

Remis adurgens - accipiter velut
Molles columbas, aut leporem citus
Venator in campis nivalis
Haemoniae -, daret ut catenis

Fatale monstrum. Quae generosius
Perire quaerens, nec muliebriter
Expavit ensem, nec latentes
Classe cita reparavit oras.

Ausa et jacentem visere regiam
Vultu sereno, fortis et asperas
Tractare serpentes, ut atrum
Corpore combiberet venenum,

Deliberata morte ferocior;
Saevis Liburnis scilicet invidens,
Privata deduci superbo
Non humilis mulier triumpho.

—*Hor: Carm: I.* 37.

1. Explain the meaning of Saliaribus, Cœcubum, Regina, Mareotico, Liburnis.

2. Parse fully, giving both accidence and syntax, the words dapibus, depromere, morbo, fortunâ, ensem, combiberet, Liburnis, deduci.

SECTION III.

Translate:—

Sed haec quidem, quae dixi, cor, [*sanguinem,*] cerebrum, animam, ignem vulgo: reliqua fere singuli. Ut multi ante veteres, proxime autem Aristoxenus, musicus idemque philosophus, ipsius corporis intentionem quamdam, velut in cantu et fidibus quae harmonia dicitur, sic ex corporis totius natura et figura varios motus cieri tamquam in cantu sonos. Hic ab artificio suo non recessit et tamen dixit aliquid, quod ipsum quale esset erat multo ante et dictum et explanatum a Platone. Xenocrates animi figuram et quasi corpus negavit esse verum: numerum dixit esse, cujus vis, ut jam ante Pythagorae visum erat, in natura maxima esset. Ejus doctor Plato triplicem finxit animum, cujus principatum, id est, rationem in capite sicut in arce posuit, et duas partes ei parere voluit, iram et cupiditatem, quas locis disclusit: iram in pectore, cupiditatem subter praecordia locavit.

—*Cic: Tusc: Quæst: I.* 10.

1. Parse fully, giving both accidence and syntax, the words reliqua, intentionem, motus, vis, triplicem, locis, disclusit.

2. Give the present and perfect tenses indicative and the supines of the verbs recessit, negavit, posuit, parere.

SECTION IV.

Translate:—

Omnes magni, etiam superiores, qui fruges, qui vestitum, qui tecta, qui cultum vitae, qui praesidia contra feras invenerunt: a quibus mansuefacti et exculti a necessariis artificiis ad elegantiora defluximus. Nam et auribus oblectatio magna parta est inventa et temperata varietate et natura sonorum et astra suspeximus quum ea, quae sunt infixa certis locis, tum illa non re, sed vocabulo errantia: quorum conversiones omnesque motus qui animus vidit, is docuit similem animum suum ejus esse, qui ea fabricatus esset in caelo. Nam quum Archimedes lunae, solis, quinque errantium motus in sphaeram illigavit, effecit idem quod ille qui in Timaeo mundum aedificavit Platonis deus, ut tarditate et celeritate dissimillimos motus una regeret conversio. Quod si in hoc mundo fieri sine deo non potest, ne in sphaera quidem eosdem motus Archimedes sine divino ingenio potuisset imitari.

—*Cic: Tusc: Quæst: I.* 25.

1. Parse fully, giving both accidence and syntax, the words mansuefacti, auribus, varietate, suspeximus, ejus, idem, celeritate, potuiset.

2. Account for the mood of esse, fabricatus esset, regerat, potuisset.

Section V.

1. Give an account of the war with the Volsci which immediately preceded the proposal of the Terentilian Law?

2. What was the purpose of the First Decemvirate, and what of the Second? What part of the Decemviral legislation was afterwards maintained?

3. Give an account of Camillus?

4. What reasons could be urged for and against the removal from Rome to Veii?

5. What were the three Comitia? By what steps did the Comitia Tributa become practically supreme?

6. How was the senate filled? What were its powers?

Section VI.

1. Give an account of Papirius Cursor?

2. Give a brief sketch of the second Punic war?

3. What was the general drift of the legislation of Sulla?

4. Give an account of the Gracchi and their measures?

5. Describe the parties of the Populares and Optimates in the time of Cicero?

6. To what causes must we assign the fall of the Republic?

FRENCH.

THREE HOURS ALLOWED.

Part I.

Candidates for a third-class certificate are to translate the following extract into English, and to answer the grammatical questions thereto annexed, in the order in which they are placed. The first part is all that is required of them.

L'invention de l'imprimerie est le plus grand événement de l'histoire. C'est la révolution-mère. C'est le mode d'expression de l'humanité qui se renouvelle totalement, c'est la pensée humaine qui dépouille une forme et qui en revêt une autre, c'est le complet et définitif changement de peau de ce serpent symbolique qui, depuis Adam, représente l'intelligence.

Sous la forme imprimerie, la pensée est plus impérissable que jamais; elle est volatile, insaisissable, indestructible. Elle se mêle à l'air. Du temps de l'architecture, elle se faisait montagne et s'emparait puissamment d'un siècle et d'un lieu. Maintenant elle se fait troupe d'oiseaux, s'éparpille aux quatre vents, et occupe à la fois tous les points de l'air et de l'espace.

Nous le répétons, qui ne voit pas que de cette façon elle est bien plus indélébile? De solide qu'elle était elle devient vivace. Elle passe de la durée à l'immortalité. On peut démolir une masse, comment extirper l'ubiquité? Vienne un déluge, la montagne aura disparu depuis longtemps sous les flots, que les oiseaux voleront encore; et qu'une seule arche flotte à la surface du cataclysme, ils s'y poseront, surnageront avec elle, assisteront avec elle à la décrue des eaux, et le nouveau monde qui sortira de ce chaos verra en s'éveillant planer au-dessus de lui, ailée et vivante, la pensée du monde englouti. . . .

Dès le seizième siècle, la maladie de l'architecture est visible; elle n'exprime déjà plus essentiellement la société; elle se fait misérablement art classique; de gauloise, d'européenne, d'indigène, elle devient grecque et romaine; de vraie et de moderne, pseudo-antique. C'est cette décadence qu'on appelle la renaissance. . . C'est ce soleil couchant que nous prenons pour une aurore.—Victor Hugo, *Notre-Dame de Paris*.

1. Parse the first three sentences of the above extract (down to "*l'intelligence*").

2. Give the five primitive tenses of the verbs:—*Revêt, se faisait, voit, devient, peut, aura disparu, sortira, prenons.*

3. "*Qui en revêt une autre*" (4th line). Can you explain this construction of the pronoun *en*, which is of frequent occurrence in French?

4. Explain the words *l', au, aux, du, des.*

5. Give the feminine of the adjectives *frais, long, public, vieux, mou, singulier, complet, blanc, malin, définitif.*

6. "*Se renouvelle*" (3rd line). When is the final *l* or *t* thus doubled in verbs ending in *eler* or *eter*?

7. "*Bien plus indélébile.*" "*Elle n'exprime déjà plus.*" Explain the different uses of the adverb *plus*, and show with an example when "more" should be rendered by "*davantage*" instead of "*plus.*"

8. Give the adverbs corresponding to the adjectives *cher, doux, faux, grossier, ardent, constant, vif, bon, mauvais, moindre, petit, sec.*

9. Can the adjectives referring to the pronoun "*on*" be construed in the feminine or in the plural? Give examples.

10. Write in full:—80 pages; page 80; 300 ans; l'an 1100; 85 livres; 120 personnes.

11. Give, with suitable examples, any three important rules on the syntax of French pronouns.

12. Distinguish between *an, jour, matin, soir*, and *année, journée, matinée, soirée.*

Translate into French:

A year ago. The last year of his reign.

We spent a pleasant day with them. The day is not fixed.

I am going to see him this evening. I shall spend the evening with him.

I take a walk every morning. What a fine morning!

Part II.

Candidates for a second-class certificate are to answer questions 11 and 12 in Part I., together with those in Part II., and to translate the English extracts and idiomatic expressions which follow.

Grammar.

1. Give some general rules as to the place of the adjective in a French sentence, and show with examples how the meaning of some adjectives is affected by the place assigned to them.

2. Illustrate with examples the principle of *euphony* as applied throughout the French syntax.

3. Write ten altogether different sentences in which the verb of the subordinate proposition, whilst used in the indicative or conditional mood in English, must be construed in the subjunctive mood in French.

4. When is *ne* to be introduced idiomatically after *craindre que, douter que, nier que?* Give examples for each verb.

5. Give the verb that corresponds to each of these adjectives:—*Beau, fort, faible, vieux, laid, lent, tardif, gras, jeune, gris, vert, gaillard, mou, ridicule, fou.*

6. Explain this line of Racine:—

Je t'aimais inconstant, qu'aurais-je fait fidèle?

Translation.

Rogers is silent, and it is said, severe. When he does talk, he talks well, and on all subjects of taste his delicacy of expression is pure as his poetry. If you enter his house, his drawing-room, his library, you of yourself say, this is not the dwelling of a common mind. There is not a gem, a coin, a book, thrown aside on his chimney-piece, his sofa, his table, that does not bespeak an almost fastidious elegance in the possessor. But this very delicacy must be the misery of his existence. Oh! the jarrings his disposition must have encountered through life.—Byron.

Unfortunately, it is too much the practice of governments to nurse and keep alive in the governed their national prejudices. It withdraws their attention from what is passing at home, and makes them better tools in the hands of ambition. Hence next-door neighbours are held up to us from our childhood as natural enemies; and we are urged on like curs to worry each other.

In like manner we should learn to be just to individuals. Who can say, "In such circumstances I should have done otherwise?" Who, did he but reflect by what slow gradations, often by how many strange concurrences, we are led astray; with how much reluctance,

how much agony, how many efforts to escape, how many sighs, how many tears—who, did he but reflect for a moment, would have the heart to cast a stone? Fortunately these things are known to Him from whom no secrets are hidden; and let us rest in the assurance that His judgments are not as ours are.—SAMUEL ROGERS.

Idioms.

1. Elle en aura une attaque de nerfs.
2. Veuillez ne pas trouver mauvais que je l'en prévienne.
3. Je sais à quoi m'en tenir.
4. Là-dessus, il s'est répandu en invectives.
5. Je ne me tiens pas pour battu.
6. Il est né coiffé.
7. Vous trouverez chaussure à votre pied.
8. Ils font maigre en carême.
9. Il lui a fallu plier bagage.
10. Ne vendez pas la peau de l'ours avant de l'avoir pris.
11. Elle est vive à la riposte.
12. Il ne sait plus de quel bois faire flèche.
13. Il court sur vos brisées.
14. Ne le prenez pas en mauvaise part.
15. Partagez le différend, et qu'il n'en soit plus question.
16. Si vous n'y prenez garde, il prendra un mauvais pli.

PART III.

Candidates for a first-class certificate are expected to translate the above idioms and English extracts, and to answer in French the grammatical questions Nos. 3, 5, and 6 in Part II., as also the following:—

Literature.—I. Name the principal works of Chateaubriand. Sketch his life, and describe the tone and influence of his writings.

2. Describe the great literary movement in France under the Restoration, and show its influence upon the public mind, and the subsequent political events.

3. Name any five of the standard literary works that were first published between 1815 and 1830.

History.—1. Explain briefly the expressions:—Fédération du Champ de Mars; Girondins; Jacobins; Montagnards; Septembristes; Terroristes; Coup d'état du 18 Brumaire; Les Cent Jours.

2. Give a short account of any one of the treaties of Campo-Formio, Amiens, and Tilsit.

(To be continued.)

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The thirty-seventh annual meeting of the British Association opened on Wednesday evening in Dundee. The present is the first visit of the Association to that city.

The attendance at the present meeting, though not equal to that which has been noted at towns of larger size, is nevertheless considerable, nearly 2,000 tickets having been issued up to Wednesday evening. The principal office-bearers of the year are:—President, the Duke of Buccleuch, K.G.; Vice-Presidents, the Earl of Airlie, Lord Kinnaird, Sir John Ogilvy, M.P., Sir David Baxter, Sir Roderick Impey Murchison, Director-General of the Geological Survey of Great Britain and Ireland; Sir David Brewster, Principal of the University of Edinburgh; and Dr. James Forbes, Principal of the United College, St. Andrews. The secretaries are Mr. Galton and Professor Hirst, with Mr. Griffiths, assistant-secretary, and Messrs. Henderson, Anderson, and Gloag, local secretaries. Mr. William Spottiswoode attends as general treasurer, and Mr. Alexander Scott officiates as local treasurer. The following gentlemen are the presidents of the sections:—A, Mathematical and Physical Science, Professor Sir W. Thomson, D.C.L.; B, Chymical Science, Professor Thomas Anderson, Glasgow University; C, Geology, Mr. A. Geikie: D, Biology, Professor Sharpey; E, Geography and Ethnology, Sir Samuel Baker; F, Economic Science and Statistics, Mr. Grant Duff, M.P.; G, Mechanical Science, Professor W. J. M. Rankine, University of Glasgow.

The inaugural meeting was attended by above 2,000 persons. The chair was taken, in the absence from indisposition of Mr. W. R. Grove, by Sir Roderick Murchison, who introduced to the audience the president elect, the Duke of Buccleuch, who delivered an address.

Professor Phillips moved, and the Provost of Dundee seconded, a vote of thanks to his Grace, and the meeting separated.

PARIS EXHIBITION.

The trial of the steam ploughs, which has been delayed by causes not very clearly explained, is announced to take place during the present month of September, at the Imperial farm at Vincennes, but the day is not yet mentioned. This, however, will not be the only occasion on which the steam ploughs of England will have an opportunity of trying their strength against each other and the rest of the world, for a private subscription has been set on foot, which, it is said, will supply the means for another and more extensive series of trials during the same month; the trials are looked forward to by French agiculturists with great interest, and there is no doubt that England will feel it, at least to as great an extent.

The manufacture of decorated porcelain and earthenware exhibits remarkable progress at the present moment, especially in France and England; the annual value of fine *faïences* produced in France is said to be ten millions of francs (£400,000), and that of china about twice that amount. One of the causes, or rather means, of the extension of the latter manufacture, is the substitution of coal furnaces in place of the costly method of wood-burning previously in use, while the introduction of medallions, slabs, and ornaments of decorated *faïence* in construction has given a great impulse to the trade, inducing the manufacturers to produce larger pieces of ware, which require special attention and study. The number of persons employed in the decoration of ceramic work in Paris alone is said to be 1,362 men and 458 women.

The number of visitors to the Exhibition is still considerably less than it was some weeks ago, the average daily attendance being, according to some semi-official returns, between 40,000 and 50,000. The number has, however, reached 60,000, and on one occasion 80,000, within the last few days, and the provinces are beginning to send up large contingents again. The inhabitants of the wine-producing provinces, however, will not be able to leave home for some time on account of the vintage, and therefore it is probable that the present month will not bring such large numbers to the Exhibition as the final month of October. Parties continue to arrive from Germany and the North, principally artizans, but including students from Upsal and other universities; these young men are in some cases dressed uniformly, and almost all wear caps, rosettes, or other objects indicating the party to which they belong.

Important corrections in the list of awards are announced from time to time, and therefore there is ground for hope that the most serious, if not all, the errors caused by the attempt to adjudge the prizes in too short a space of time will be corrected. Many people in England object to the system *in toto*, but this is not the feeling on the Continent, and while juries exist it is most important that the examination of the objects exhibited should be more complete, and the consideration of their claims to reward more careful than could possibly be the case in the short period allowed for the operations of the juries in the case of the present Exhibition.

The question of concessions has been another fertile source of complaint, and one of these has given rise to a very unpleasant act. The Imperial Commission granted to a M. Bernard the sole right of letting chairs to the

public, in consideration of his paying a certain sum of money for the privilege; the restaurant-keepers of all countries, who pay heavy rents to the Commission, placed tables and chairs outside their establishments for the use of their customers, an act which M. Bernard regarded as an infringement of his privileges, and against which he protested. Failing in his attempts, he had recourse to the tribunals, brought an action against the Imperial Commission, and obtained a verdict in his favour; in consequence of this decision, the Imperial Commission, having given due notice to the proprietors of the restaurants and cafés to remove their chairs, and the latter having declined to do so, swept them all away. An appeal has been made to the proper tribunal on the subject, but the court ruled that the Commission was compelled by the decision against it to act as it had done. It is well that occurrences of this kind should be made known and well considered before the interest has departed from them, not with any intention of throwing blame upon the Commission and officers, who have most onerous duties to perform, but in order to supply hints which may be of use on future occasions.

It is said that a beautiful cabinet, for which a grand prize was awarded to M. Fourdinois, of Paris, has been purchased for the South Kensington Museum. M. Fourdinois has in the production of this cabinet combined the art of inlaying with carving. The design being laid down upon one piece of wood, and this laid upon a piece of a different colour, say box upon ebony, for a strong contrast, the design is cut out by the ribbon saw, and the pieces thus separated being changed, you have in one case a yellow ornament on a black foundation, and in the other the reverse. The carver may now cut away the ground to any extent necessary for the relief of the pattern, and may act upon the two pieces of wood separately or in their proper relative positions as may be most convenient. There is also another important advantage in the system. Suppose it is required to decorate the face of a bracket, or any other portion of a work having an irregular outline, two pieces of wood of the colour required are selected and the ornament cut out by means of the saw; the pieces are then separated, and the desired form given to the ground piece by means of the beading plane or other tools; the carver will then operate upon the other piece, giving the ornament whatever amount of relief may be required.

SUEZ CANAL.

The Suez Canal Company have given a very complete representation at the Paris Exhibition of the work in which they are now engaged. A separate building in the park is entirely devoted to this object. The country is represented by a large plan in relief, occupying one entire room of the building. Models are exhibited of the principal machines used in digging the canal. Specimens of the soil of the isthmus through the course of the canal, and different natural productions from it, are shown. To give a general idea of the progress already accomplished, a panorama of the Canal of Suez in the state it was in April, 1867, is exhibited.

The relief plan has been made from the best maps, under the direction of the engineers of the company. Entering from Europe, we first come on the canal at Port Saïd; here there is a double pier, the object of which is to serve as a shelter to ships, between its two walls, with a depth of water 10 mètres. The pier on the west will be 3,000 mètres long, and half has already been made. That on the east will not extend so far; its protection is less required, as winds rarely blow from the east on this shore; 1,800 mètres are considered sufficient. The works are being pushed on in order that they may be finished before the end of next year. A whole fleet of merchant ships will be readily encompassed by its gigantic arms.

Stones are rare in the Isthmus, and the foundations of the piers were commenced with stone brought from a quarry situated beyond Alexandria; this quarry was insufficient for the purpose, the expense of transport was great, the construction went on slowly, and was very costly, and its employment had, therefore, to be abandoned. Several very important hydraulic works elsewhere having been satisfactorily executed by means of artificial blocks, the Suez Canal Company have employed the contractors for those works to construct the piers of Port Saïd. These blocks are made of sand and lime from Theil; this mixture is moistened with water, and dried in moulds; two months under an Egyptian sun are sufficient to harden these blocks, and their subsequent immersion in water adds to their hardness. Each block weighs 25,000 kilogrammes. Steam cranes, with great levers of wood and iron, raise them up and put them in their places with the same ease that a mason lays a brick in a wall. The joints between the artificial blocks are filled in with small pebbles, which, assisted by the action of the sea, form a compact and solid mass. The piers, at their shore ends, are distant a space of 1,400 mètres from each other, but gradually contract to an opening of 400 mètres at their mouth. The triangle thus formed covers a large area of calm sea, where hundreds of ships ride in shelter, waiting for their turn of passing through the Isthmus. The construction of this breakwater will require 250,000 cubic mètres of blocks. At the end of April, half of these had been submerged, and the work is proceeding steadily. Along the western pier a channel of 100 mètres of breadth has been already excavated to the depth of 6 or 7 mètres, and at the present time the large ships belonging to the Messageries Imperiales anchor there.

Since the commencement of last June vessels coming and going could put in at Port Saïd. Having entered the port a vast parallelogram of ground appears, enclosing a surface of 36 hectares of water (about 90 acres). This great basin has four deep indentations which form secondary basins. On the west the basin of commerce, containing 4 hectares; the basin of the arsenal, 3 hectares; the basin of Four-à-Chaux, 5 hectares; and on the East the basin of the marine, 3 hectares: the total area of the port, including these basins, exceeds 51 hectares (or about 127 acres). In April, 1867, there remained to be raised 2,732,000 metres of earth, in order to excavate the port and basin of Port Saïd and form it to its full depth. Eight dredging machines are employed, and they each raise 1,200 mètres per day, so that in ten or eleven months the work may be expected to be finished. Port Saïd is the first step towards the civilization of this country. It is only a few years since M. de Lesseps and his companions made their exploring visit into the Desert, where no human being up to that time had taken up his abode, and when the land now forming the site of Port Saïd was covered with the waters of Lake Menzaleh. A small strip of sand, of the breadth of 200 metres, formed the outline of the sea coast, a small barrier, beaten on the one side by the waves of the Mediterranean, on the other by the waters of the lake. No tree, nor even a blade of grass, grew there sufficient to shelter the sea birds. It was here that the first stroke of the spade was given to open the cutting destined to form a passage for navigation between Europe and Asia. By the side of this cutting habitations arose, at first humble and afterwards of a more ambitious character. By degrees the band of earth increased, and the produce of the excavation filled up the marsh, and so formed a foundation for the city. The excavated earth was employed for the embankment, and the soil by degrees rose above the water, and the lake was driven back. Wooden cottages, imported from France, were erected on it, and then followed houses in masonry, specially constructed for workshops and as residences for the employés; an hotel for travellers, shops nicely ornamented, a lighthouse, a chapel, and hospital succeeded. The residence of the employés and workmen gave rise to native speculation, fresh food was brought in from the interior,

and a market was established, which, though humble at first, was most useful. Thus was founded the first village in the isthmus. Port Saïd has now ten thousand inhabitants. It is described as an agreeable city, half industrial and half picturesque; its situation is charming. Large numbers of fishing boats ply their trade on the lake, producing, it is said, a return of half-a-million francs. The history of the rise of Port Saïd is the history of all the other towns and workshops on the isthmus. One may form a just idea of the rapidity of their foundation and the conditions of their growth by the preceding description. The canal, on leaving the port, traverses Lake Menzaleh. Formerly this lake and the surrounding marshes were cultivated plains, endowed with that Egyptian fruitfulness so celebrated in antiquity, and which ministered to the wants of the Romans. A branch of the Nile (the Tanitic branch) washed the walls of royal towns which have now disappeared beneath its waters; some bricks and pieces of pottery and rare statues in the Cairo and Boulac Museums are all that remain of that lost race—the gloomy and still water covers their dwellings. As far as the view extends on the east, to the west, and towards the south, in going from Port Saïd, a sheet of water is seen, here and there dotted with verdure, which formerly were firm hillocks of ground, but are now deserted islands.

The marsh extends a great distance to the right, towards Rosetta and Daimetta, celebrated for the misfortunes of Louis IX., the chief of the seventh Crusade; to the left it stretches to the Desert, and loses itself in the sand; towards the south it occupies half the space which separates the two seas. Embarked in one of the steamboats, which perform the daily service with regularity, the traveller can observe the general configuration of the isthmus on the line of our navigation, that is to say, between Port Saïd and Suez. It is a depression of land towards which the two sea coasts formerly stretched. The waters of the Mediterranean had a tendency to join the Red Sea. One may suppose that the former entered the Lake Ballah, whilst the latter is generally allowed to have reached as far as the northern extremity of the Lac Amer. A barrier hindered their union, formed of two elevations of land, containing a basin of fresh water, peopled with crocodiles, called Lake Timsah. These two elevations, called El-Guisr and Sérapéum, have been cut through by the Canal Company. El-Guisr was the most elevated. It was 20 mètres above the water, and formed the obstacle on the Mediterranean side. Sérapéum was eight mètres high, but the mass prevented the passage of the waters of the Red Sea. El-Guisr was pierced chiefly by Egyptian fellahs. Sérapéum has been excavated by dredging machines, and the cuttings which traverse it will soon be lowered to the level of the canal.

To recapitulate. The canal of Port Saïd, up to the plateau of El-Guisr, passes through the great Lake Menzaleh, then the Lake Ballah, now without water. It passes across El-Guisr, meets Lake Timsah, then Sérapéum, another opening, which it clears in order to arrive at the incline turning towards the Red Sea, and the Lake Amer, and the Plain of Suez. The principal town, where the management of the Canal Company is carried on, is at the central point, by Timsah, between El-Guisr and Sérapéum, and is called Ismaïla, named after the Viceroy of Egypt. Port Saïd was named after his predecessor Mohammed Saïd Pacha, who gave great assistance in the formation of the Canal Company. Ismaïla is larger and more elegant than Port Saïd.

Port Saïd is specially the centre of the workshops of the Company. Dredging machines, boats, and engines of all kinds are built and repaired there. The cargoes of the ships are received there, to be forwarded and distributed in the isthmus. It is the principal seat of the operations for the transit of merchandise, which, coming from the Mediterranean, is carried from the Port of Suez to its destination in the extreme East. The great Steam Navigation Companies, the Russian Company of Odessa, the Messageries Imperiales, and the Marseilles packet-boats, send their vessels there.

The general manager of the works lives at Ismaïla; all the offices are grouped round him. The president of the company also resides there. His presence has tended much to raise the tone of the workmen in these isolated workshops, where some hundreds of men live, grouped as shipwrecked sailors, upon a rock, in the midst of an ocean of sand. He is popular and respected, and possesses those qualities which command obedience.

M. Borel and M. Lavailley, the contractors of the Suez Canal, are men of experience. They have carried on the management of the works at Ismaïla, but for the accommodation of the service they have just removed. The Government of the Viceroy is represented at Ismaïla by an Egyptian functionary; he inhabits the finest building in the town, erected from the plans of a former engineer of the company, now the director of bridges and highways in the Egyptian service, M. Sciama Bey. A few years since, the Lake Timsah was a basin without water, in which grew bunches of rushes burnt up by the sun; it now presents the pleasing aspect of a vast sheet of water. Ismaïla was a hillock of sand, as naked and sterile as it is possible to imagine; now it is fertile and well-peopled. Fresh water is sent from thence to Port Saïd, eighty kilometres distant, by steam force-pumps. Two months since an Austrian ship—the first which passed the canal from Port Saïd on her way to Suez—by chance her name was *Primo*—put in at Ismaïla. The crews landed there and collected enormous bouquets, for already flowers are numerous there. Two days after they entered, by means of the fresh-water canal, Suez, ornamented with fresh garlands of natural flowers. The desert is, indeed, changed, under the industrious band of the Suez Company, with the help of the two principal fertilisers of Egypt, water and sun. Timsah is situated where the maritime canal meets the fresh-water canal. On the plan in relief is seen a strip of verdure marking the course of the fresh-water canal, which, starting from the banks of the Nile, advances through the sands towards the isthmus. It is the land of Goshen, mentioned in the Bible where Jacob and his sons, summoned by Joseph, established pasturages in the land. It is from thence that the great emigration of Jews, led by Moses, started. Its history, related in the Holy Scriptures, can even now be followed step by step. The company has excavated in this valley the bed of a canal which connects Lake Timsah with one of the branches of the Nile, still bearing the name of Moses, in remembrance of the great Hebrew legislator who was exposed there; this is what is called the fresh-water canal, and which runs in a straight line to Timsah, and after arriving at this point, turns to the south and descends parallel with the maritime canal as far as Suez, where it falls into the live sea. In passing, it waters and supplies Ismaïla; its breadth is about 15 mètres by 2 deep. By this way the company have for some time conveyed to the isthmus grain, provisions, materials, and travellers. The water which serves it there supplies the yards and population. This canal serves for the conveyance of merchandise, either from Suez or Port Saïd, until the maritime canal is open and free from one sea to another. The greater part of the maritime canal, which extends from Ismaïla to Suez, will be occupied by a basin of great extent; here are the Lakes Amer. The waters of the Mediterranean and the Red Sea will fill it when the approaches on the north and south sides are completed. At these two extremities the earth is studded with rocks, the extraction of which occasions expense and trouble. It is most probable that the Red Sea has penetrated to these lakes at a remote epoch, for at the depth of several mètres salt deposits are found. A specimen of this substance, carved in the form of a column, has been placed at the entrance of the Suez collection in the Paris Exhibition. It only imperfectly shows the thickness of the saline bed,

which is, besides, covered in several places with mud half dry. This part is dangerous. One of the employés nearly lost his life there; he was submerged as far as his waist for 24 hours, keeping himself up by means of a plank, in great danger, till he was rescued. The Lakes Amer, which will contain 900 million mètres of water, will form an inland sea where ships will be exposed to the action of the winds and the agitation of the waves, but the company will take care to establish the necessary works to assure the security of the navigation. It is however more than doubtful if these precautions may not be unnecessary; in the mean time it is expected that the great mass of waters contained in these lakes will balance the waters of the Red Sea on one side, and the currents produced on the other side in the Canal by the winds of the North-West, which prevail during one part of the year. This fortunate disposition of nature renders unnecessary the construction of locks, which would have impeded navigation in the maritime canal. The Suez Canal, 100 mètres wide at the water-line and 8 mètres deep, will form a kind of Bosphorus, or, according to the comparison of the late Robert Stephenson, expand like a gigantic ditch, since in its excavation 60 to 70 millions cubic mètres of earth will be raised.

(*To be continued.*)

SMOKE CONSUMPTION IN THE POTTERIES.

The *Staffordshire Sentinel* writes thus:—

The smoke consuming clauses of the Sanitary Act, 1866, were fully explained in the *Sentinel*, when first the Act passed. We then stated that the law would come into operation in the month of August, 1867. The interval of upwards of twelve months was very properly allowed, so as to give time to manufacturers to adapt their processes of burning coal to the provisions of the law. The time thus allowed was ample, and in some towns the greatest known improvements in the combustion of coal have in the meantime been adopted by manufacturers, to the great abatement of an intolerable nuisance, and a not less saving of money; and the local authorities, with a view to giving practical effect to the law, have appointed smoke-suppression committees and salaried inspectors of the smoke nuisance. No manufactures are so prolific in the generation of smoke as those of pots and iron. In the Pottery towns both these manufactures are carried on to an immense extent, so that the smoke nuisance prevails there to a greater extent than in any part of the kingdom. The Potteries are consequently a dark and dingy district, in which the bluest skies are constantly overcast with gloom, where cleanliness is absolutely impossible, and where no man can breathe without inhaling coal smoke to a greater or less extent. To the Potteries, therefore, more than to any other part of these islands, the Sanitary Act, 1866, is a boon; and in these towns, above all others, obedience to the new and wholesome law is required by public economy and public health. If, therefore, efforts should be anywhere made to bring the statute into practical operation, it should be there. The local authorities of the district might have been expected to evince a commendable activity to ensure universal obedience, and the manufacturers to vie with each other in the adoption of the greatest improvements in the consumption of smoke. What, then, has been done? The local authorities, accustomed as they always have been to a most polluted atmosphere and to murky skies, have been about as serenely indifferent as if the skies were of Italian azure, and the air as pure as that on mountain tops. Town Councils and Improvement Commissioners have been as inactive in the matter as though they were non-existent; and as for the Chamber of Commerce it has done absolutely nothing. In all other trades, chambers of commerce take the lead in every amelioration which the staple manufactures share in common, and innumerable public advantages are monuments of their vitality and usefulness; but that of the Potteries is like a torpid body, which only occasionally, and at long intervals, gives signs of life. It so seldom speaks, and so seldom acts, that its voice and its acts might be supposed to be those of a somnambulist. Its meetings, too, unlike those of other Chambers of Commerce, are held altogether in private.

An attempt has been made to consume smoke in the firing of pottery wares, by Messrs. Holdcroft and Wood, of Sandyford, Tunstall. Their plan has been adopted by several manufacturers in Hanley, Fenton, Tunstall, Sandyford, and other places, and it consists simply of a tube in the centre of the oven, down which, instead of escaping at the top, all the smoke and other volatile products of coal fire are forced by a downward draught caused by a subterranean connection with a high chimney adjacent. But this is done during a part only of the firing process. Our Stafford contemporary of the 6th instant, states that this simple process prevents waste and nuisance in a surprising degree, that the escape of smoke and heat is to a great extent prevented, that the smoke is mostly consumed in the downward draught, that there is a consequent saving of from three to four tons of coal per oven, and that the loss by broken saggars is reduced by one-third. Now every really intelligent student of natural philosophy must know, and does know, that a mere downward draught cannot possibly so increase the process of combustion as to prevent the escape of smoke to a surprising degree, and every practical man knows, as a matter of fact, that these details of the alleged results of the downward draught are a series of exaggerations. The downward draught, as adopted in the ovens of the above manufactures, has just one main result, viz., that it prolongs the presence of the escaping heat, by forcing it down a central tube in the oven, and along a horizontal one under the oven, before allowing it to depart through the chimney; and by thus bringing the draught under the oven floor the lower part of the oven, which by the common process is the last to be heated, is made hot earlier. This is all that it does, but that little is important, for the heating process is thus made more equal over the oven, and consequently the wares at the bottom are more quickly fired, and thus there is a saving of coal. But the coal saved per biscuit oven is not from three to four tons, as stated, it is about two tons only. The smoke is indeed diminished, but not so much by more perfect combustion as by the diminished consumption of coal. The diminution of smoke is simply owing to the absence of the smoke of the two tons of coal that are saved; and as heat is brought to the bottom, the usual excess of heat during the usual time, so destructive to saggars, at the top, is diminished. Such are in truth the very moderate advantages of the new plan so exaggerated by our contemporary. But still the smoke of the oven is unconsumed, as is testified by the dense volumes of black elements which are seen to leave the chimneys that receive the downward draughts of the ovens.

Many alleged improvements in the firing of the potting ovens have been from time to time invented, some of which have been patented, but several of the number have been ridiculous, and all have been more or less failures. The experiments connected with them have been so costly, several of them have been so ruinous, and all of them so ineffectual, that the possibility of using up as fuel the prodigious quantity of smoke given out by a biscuit oven is commonly regarded as hopeless. But nothing is impossible that is not unnatural. It is only ignorance or indolence that despairs. To assume that so enormous a waste of most valuable fuel, and so fearful a nuisance as that which pollutes our breath, and covers us like a funeral pall, cannot be prevented, were to reflect upon the capacities of nature, and upon that science whose modern marvels past ages would have accounted miracles, and whose present state is but the infancy of its future. As in human affairs one thing leads to another, and a second step in progress is frequently one

which no man expected to rise from the first, it may be that the pottery ovens may eventually find their model in the unique kiln, which for a very different purpose is now being built at Longton. The brick is in itself the simplest and most primitive of all manufactures, however wonderful in power and in quickness of action may be the machine by which it is made; and the artistic forms which the skilled modeller has produced, and which the hands of the engraver, the painter, and the gilder have decorated, are things of beauty, which are a joy for ever; but the simple body of clay in the rude quadrangular brick, and the very composite body of clay in the form which is beautiful as the offspring of Nature, are hardened by the same identical process. In both cases a soft and plastic element, which in the human hand takes any form that is given to it, is made hard as rock by fire. The hardening of the coarser object by the new process is perfect, and in that process the expenditure of fuel is reduced in the proportion of from seven or eight to one, every particle of smoke is so consumed that the escape from a chimney is so invisible as scarcely to indicate the presence of fire, and consequently an immense saving of fuel is effected, and a great nuisance is completely suppressed. This process, which will be shortly in operation in Longton, is in other places a proved success in relation to the coarser manufacture, may it not also, by well-considered adaptations, become as complete a success in relation to the finer objects of human art? Let the reader again examine that process, as described in our last issue, and he may perhaps coincide with us, and with others, practical men, in the opinion that the probabilities of success in firing earthenware and porcelain by the new process adopted in burning bricks, are so great as to make the experiment not merely expedient but a public duty. It may be wise not to be too sanguine after so many and signal failures, but the new idea is fraught with all the elements of hope, and there are men of great practical experience, and who are not given to romance, who at present fail to discover any reason for doubt. Should this prove to be the solution of the most perplexing of all pottery problems, it will afford us profound satisfaction to have been the means of promoting it. And in that case, since the consumption of smoke generated by the fires of steam boilers and of slip-kilns is an easy process, which yields an ample return upon the outlay, and since iron furnaces may be fed with coke, there will be some hope of the potteries obtaining clearer air and brighter skies than have been ever known by their present inhabitants. At all events we trust that the experiment, under the most favourable conditions, will be made as early as possible.

Smoke can be consumed in every manufacture, as is proved by innumerable facts, and what can be done ought to be done. It is consumed almost everywhere else, and ought to be consumed here. In Mr. Doulton's pottery kilns, Lambeth, smoke is completely prevented by mechanical contrivances, so that though his works were at first specially exempted by enactment, he has effected the removal of the exemption, and voluntarily subjected himself to the law. However heavily charged with fuel his fires may be, there is no escape of smoke. The large iron district of Middlesborough, where furnaces and various ironworks abound, is an almost smokeless region. In London there is a Smoke Prevention Department of Police, and by rigorous supervision the smoke of every furnace is constantly suppressed. The nuisance is not merely mitigated, but is in every instance absolutely prevented. The breweries, the ironworks, the marble works, the largest bakeries, the saw mills, the vast coke ovens, the fires of the Bank of England and of the Royal Mint, and works in which refuse of all kinds, wet shavings, and the commonest slack are used as fuel, all are quite free from smoke. In Leicester the work of smoke prevention is devolved upon the Borough Surveyor and the police, and it is thoroughly done. In Bradford the Town Council has taken prompt and effective measures to suppress smoke in every branch of trade, and with complete success; and in a report of the Smoke Nuisance Committee recently made, and which now lies before us, it is stated, as the result of many trials, and of observations in various parts of the kingdom, that "smoke can be completely prevented with advantage to the owner, and that this can be done with any kind of fuel, and in every description of work or manufacture." Where the law has been enforced, it is now obeyed spontaneously. Manufacturers have been required to consume their own smoke from public considerations, but they now consume it as a saving of money. The more smoke they burn, the less fuel they have to buy. From time immemorial they have thoughtlessly and ignorantly been allowing excellent fuel to escape, to deform, to defile, and almost to poison, every animal and vegetable form of life around them; but they have been compelled to learn the lesson which teaches how to detain the vagrant element at home, and to convert a mischievous enemy into a most useful friend. What they first did as a duty they now do as an act of economy. They turn smoke into gold. In this case, as in every other, self-interest is identified with public duty, and manufacturers who find smoke so lucrative an element in their own furnaces, will never more be so extravagant and so unjust as to send it forth to annoy the eyes and lungs of their neighbours, to fill the streets and houses with noxious exhalations, and to spread gloom, dirt, and barrenness over the adjacent gardens and fields.

The work of smoke prevention must be done, and if the local authorities show themselves, by inaction, to be incompetent, the interposition of the Government will be most certainly invoked and obtained. The law is not a permissive one. The requisitions are imperative, and leave no option to incompetence, negligence, or hostility. The local authorities are the best and most proper executives of the law. If they carry it into effect there will be no interference with their legitimate functions, and no needless expense will be incurred, but if they do not, a public officer will be unquestionably appointed, whose salary and whose expenses will be paid from the local rates, and who, from his less practical acquaintance with our staple trades, may show less consideration than neighbours, as men of business, may show to each other.

There are many methods of consuming smoke, any one of which is better than none, and in the event of complaint being made the justices may, without appeal, order the nuisance to be suppressed, and in default the owner or occupier is liable to the daily penalty of 20s. And it will be well for town councils and commissioners to note that by section 16 of the Sanitary Act, about to come into operation, the Secretary of State is empowered, on proof that default has been made by the local authority in "doing its duty," to authorise the chief police officer to enforce the law, the effect of which will be to make the police officer paramount to the authority which practically abdicates its office; and by section 49, the Secretary of State is also empowered, on complaint by any one, and proof that the local authority has made default in enforcing the provisions of the Nuisances Removal Act, to order the local authority to perform its duty, and, if not complied with, to appoint any person to perform it, and to direct that all expenses be paid by the local authority, together with such reasonable remuneration to the person appointed as the Secretary of State may determine. It is therefore very clear that unless the local governing bodies very promptly and effectually set about the work of giving effect to the law their authority will lapse, they will be deservedly treated as nonentities, and a Government nominee will appear amongst us, armed in his own person with full powers to carry out the law. Our local authorities must consequently very quickly make their choice, either to undertake the wholesome and salutary work of suppressing a great and most

costly nuisance, or to see themselves ignored, and the work done by a salaried stranger, all of whose costs they will undoubtedly have to pay.

Fine Arts.

Imperial Grand Prize in Fine Arts.—The Paris Academy of the Beaux Arts, or rather the five academies of the Institut of France, have awarded the Emperor's grand prize of 20,000 francs to M. Felicien David, the composer. This prize is awarded alternately in the several faculties of the Institut.

Manufactures.

Mulhouse Society for Prevention of Accidents in Factories.—The idea of an association, having for its object the prevention of accidents in factories in which steam is employed, is likely to be carried into practical operation in France. Twenty-two manufacturers of Mulhouse and its vicinity have met and subscribed the sum of 7,000 francs. These gentlemen employ nearly half a million of spindles, 3,340 power-looms, and 62 steam-printing machines. The Association proposes to act in various ways—by combined action and arrangement, by the communication of the best methods of preventing accidents, and by the appointment of a salaried inspector, whose duty it will be to visit all the establishments in company with the proprietors, or of some one appointed by them, and to confine his observation strictly to the one object in view. The inspector is to note all his observations in a register, and to leave a copy with the manufacturer; and he will take note of all accidents, and draw up a report from the accounts given him by manufacturers, managers, and workpeople, and he will also make an annual report to the Association. The subscription is fixed for the first year at 10frs. per 100 spindles, 25 centimes for each power-loom, and 20frs. for each steam cylinder-printing machine. The Association intends also to collect, as soon as possible, the materials for a manual for the use of overseers, foremen, and workmen, informing them of the principal precautions to be taken, and the arrangements to be made to prevent accidents of all kinds. This Association is worthy of the men of Mulhouse, who have done so much for working men by the establishment of schools, industrial societies, and economic residences.

Commerce.

The Cotton Trade.—Messrs. George Fraser and Co.'s circular, dated Sept. 2nd, says:—"The business in our market during the month just ended has been of a highly unsatisfactory and of very disheartening character. There appears to be a general want of confidence, and, in consequence, increased difficulty in moving off the present comparatively large production of yarns and goods. Spinners and manufacturers being unwilling, as a rule, to go into stock, continue to force sales at the best prices practicable, as they seem disinclined so far to adopt the more salutary course of closing their mills or working "short time." Thus, while there has been no decline in the price of American cotton at Liverpool, $\frac{1}{2}$d. per lb. only in that of Pernams, $\frac{3}{4}$d. per lb. in that of Bombay and Bengal cottons, and $1\frac{3}{4}$d. per lb. in that of Egyptians, previously unduly high, yarns have declined from $\frac{3}{4}$d. to $1\frac{1}{2}$d. per lb., and goods still more in proportion. The position of the trade has consequently changed materially for the worse, and every day it becomes increasingly evident that an extensive resort to "short time" is imperative if prices are to be maintained at even their present comparatively low level. As a further proof of this we have only to glance at the position of the leading India markets. They are already over supplied with goods, and with excessive shipments on the way, so that the latest prices advised by telegraph do not cover the lowest prices receded to on this side. From China the accounts are much more favourable, and show fair profits, but as the stream of shipments is now being directed thither instead of to India, it is to be feared that a similar phase will be exhibited there also at no distant day. The home trade continues very inert, but more perhaps now from the general want of confidence than from any other cause, as the very splendid weather we have had of late has enabled great progress to be made with the harvest. Thus as the American and Canadian harvests have this year been also very fine and abundant, we may look for a gradual return to a lower price of food from abundance, which is the most important element of all in its bearing on the prospects of our home trade. But, also, it may be expected to be favourably affected by the great cheapness of money, and by the rise in the value of railway property, and the gradual, albeit slow, and at times uncertain, restoration of confidence in such and in kindred investments. We look, therefore, to a gradual and steady revival, ere long, in the home trade. There is nothing new bearing upon the future supply of cotton. The weather in America appears to have been propitious for the growing crops, and countenances the expectation so far of a yield of $2\frac{1}{2}$ millions of bales or over. But anything like definite estimates are premature, and can only fairly be formed when the first killing frost takes place. They will probably reach us towards November or December, when also the prospects for the India, Turkey, Egypt, and Brazil supplies may be to some extent estimated, and a notion be formed of the total supply for the following year."

Colonies.

State of Victoria.—This colony is now exporting large quantities of wheat to England. Some of the squatters are making preparations to boil down their sheep for tallow, in absence of a market for the meat; bread is selling at from 5d. to 6d. the 4 lb. loaf; beef and mutton from 3d. to 6d. per pound; potatoes at £3 per ton; and excellent wine, of colonial growth, at from 4s. to 5s. per gallon. Local production in all that concerns a supply of the necessaries of life is considerably in excess of local consumption, and the progress of the colony is literally arrested by the want of immigration. These facts cannot be repeated too often, nor impressed too strongly upon the minds of our countrymen at home. The population of this colony is counted by hundreds of thousands only, while the country is capable of maintaining millions, with a wide field for the enterprise of the restless and the adventurous in the neighbouring colonies, and in the innumerable islands of the Pacific. What a mere handful of people has accomplished in Victoria chiefly since the year 1851, may be accepted as an earnest of what may be effected by still larger numbers, actuated by the same spirit of industry and energy, in the time to come. They have built and conferred municipal institutions upon upwards of 60 cities and towns, containing 70,000 habitable dwellings, more than 300,000 souls, and rateable property of the estimated value of £20,000,000. Outside of their limits are the rural shires and road districts to the number of 100, with 54,000 houses, 253,000 inhabitants, and rateable property exceeding £16,000,000 in value. For the spiritual wants of the people 1,700 churches and chapels have been erected, and for the education of the young upwards of 700 common

schools have been opened, upon the rolls of which the names of 70,000 children are inscribed. Some of the most important towns of the colony are brought into direct communication with the seaboard by 271 miles of railway and 3,000 miles of telegraphic wire; and 525 post-offices furnish the colonist with every requisite facility for the transmission of his correspondence. Pastoral and agricultural pursuits provide employment for 55,000 men and women, mining for 80,000 men; and 900 mills and manufactories afford occupation to nearly 10,000 persons, exclusive of several thousands who are engaged in various handicrafts in Melbourne and other large towns. It is calculated that every man, woman, and child in Victoria annually consumes manufactured articles, the produce of the United Kingdom, of the value of about £12, while the imports from other British possessions are equivalent in value to £6 per head of our population. And since there are branches of manufacturing industry which can only be successfully prosecuted in countries possessing cheap capital, cheap labour, great mineral wealth, and matchless means of intercommunication like England, it follows that the supplies of certain articles of general consumption will continue to be drawn from thence for many years to come, and that, therefore, the growth of colonial population by immigration implies the extension of one of the largest and best markets to which the parent state directs her commerce. The following statement shows the population of the colony of Victoria for the last 10 years:—In 1857, 463,135 persons; in 1858, 504,519 persons; in 1859, 530,262 persons; in 1860, 537,847 persons; in 1861, 541,800 persons; in 1862, 555,744 persons; in 1863, 574,331 persons; in 1864, 605,501 persons; in 1865, 626,639 persons; in 1866, 643,912 persons. The population of the gold fields gives a gross total of 257,264, or about three-sevenths of the population of the country. Of these 70,794 are miners, of which 20,134 are Chinese, and 50,660 Europeans.

Sydney Squatting.—Notwithstanding the losses which the squatters of Riverina have sustained latterly they have been expending large sums of money in improving their runs. On every run from Dubbo to the Warrigo, and from the Queensland border to the Lower Barwon, dams have been erected, wells sunk, and large areas fenced in. Vast quantities of new country have also been taken up in the far west, and the flocks and herds of the squatters are now to be found almost in the very heart of the Australian continent. In those parts of the country most subject to droughts, wells have been sunk at a very great expense, and are capable of watering from 10,000 to 50,000 sheep; it is not, therefore, very probable that there will be any want of water this summer, and added to these efforts of the squatters themselves, the government, it is said, intend to lock the Murrumbidgee somewhere below the Yakoo Cutting, and thus store up an immense quantity of water. The cost of this enterprise will be about £50,000. The government will supply the water to those requiring it at a very low rate. Stock generally throughout the country is in good condition. Some valuable cattle have been imported lately in large numbers, and the improvements which have taken place in the breeding of colonial stock for some time past will doubtless continue.

Progress of South Australia.—Returns show that the combined export and import trade rose from £3,000,000 to £6,000,000 during the ten years ended 1865; that in the same period the exports of produce increased from one and a quarter million to two and three-quarters; and that between 1858 and 1865 the area of land under cultivation rose from 264,000 acres to 660,000 acres. In no other colony, in fact, could so small a population, 160,000, point to more substantial proofs of prosperity. The amount of taxation paid through the Custom-house in this colony, during 1865-6, was 30s. per head; in New South Wales, 40s. per head; in Victoria, 32s.; and in Queensland, 76s. per head. In the matter of the bonded debt the comparison is still more striking. South Australia, with a population of 165,934 souls, owed at the close of 1866, £751,600, or £4 10s. per head, whilst for the other colonies the returns were as follows:—

	Population.	Debt.	Per head.
New South Wales	421,000 ..	£5,638,530 ..	£13 8s.
Victoria	632,998 ..	8,733,445 ..	13 16s.
Queensland	95,100 ..	3,021,186 ..	31 15s.

These figures show that if there ever was a colony that ought to prosper South Australia is the one.

Melbourne.—The value of the imports and exports at the port of Melbourne, for the present year, to June 22, is as follows:—Imports, in 1866, £6,497,305; in 1867, £5,572,348. Exports, 1867, £5,407,536; 1866, £5,179,045, showing a decrease in the value of the imports of £924,957, but an increase of £228,491 in the exports. The following is a statement of the revenue of the Victorian railways for the month of April, 1867:—

Lines.	Passengers, Horses, &c.	Goods.	Total Revenue.
	£ s. d.	£ s. d.	£ s. d.
Murray River	8,889 9 1	14,032 10 9	22,921 19 10
Williamstown	1,150 6 9	1,715 7 3	2,865 14 0
Ballarat	7,460 15 1	8,391 10 6	15,852 5 7
Total ..	17,500 10 11	24,139 8 6	41,639 19 5

The total number of passengers on each line was:—

Murray River line	18,733
Williamstown line	43,069
Ballarat line	14,077
	76,879.

The total amount of receipts from the commencement of the year 1867 to 20th June, amounted to £247,145 7s. 6d., showing a weekly average of £10,087 11s. 4d. The revenue, from the commencement of the year to 20th June, on the Melbourne line and Hobson's Bay Company railway, was £595,590 17s. 6d., averaging £2,439 7s. 6d. weekly.

Obituary.

Dr. Velpeau, one of the most eminent surgeons that France has produced, expired suddenly in Paris last week, at the age of 73. Dr. Velpeau was the son of a farrier, of the village of Brèche, in the department of the Indre and Loire, and self-taught even as regarded the very elements of education. He afterwards studied at Tours and came to Paris, where he obtained his full degree in 1823, and a few years later was elected member of the Academy of Medicine, and afterwards of the Institut. Dr. Velpeau also published a number of important works on operative surgery, embryology, and anatomy.

Notes.

Paris Exhibition Jury Awards.—The Abbé Moigno, in the French scientific journal *Les Mondes*, thus characterises the decisions of the juries:—"No judgments have ever been received with less favour than those of the juries of the Exposition Universelle of 1867. How can we say a word in their favour when we are met on all sides with strong protests and angry accusations, when everywhere the words incapacity, partiality, injustice, &c., are freely made use of. The members of the jury were of the highest position, but they were hurried, were overworked, and bewildered; no time was given them for arriving at a sound de-

cision, it was an absolute impossibility for them to establish a real competition between the parties, to make on the spot those trials which alone can conscientiously justify the exercise of the judgment. Ill supplied with information, they have yielded to the influence of high sounding names, personal sympathy, blind friendship, and the claims of interest; the first have become last and the last first; mediocrity has carried off the great rewards of gold and silver medals, and even the Cross of the Legion of Honour; real and admitted merit has been reduced to a bronze medal, honourable mention, and even passed over in silence."

Partial Destruction of the Church of San Giovanni e Paolo in Venice.—A portion of this celebrated edifice, which was commenced in the beginning of the thirteenth century, and contains the tombs of the Doges, has been destroyed by fire; a fine work by Titien, "The Martyrdom of St. Peter," was consumed.

Submarine Telescope.—A new instrument with the above name, which may be of considerable service, was tried the other day in the St. Martin's Canal, in Paris; no description is given of it, but it is probably an application of the principle of the surgical mirror. One end of the instrument is placed near to the hull of a vessel or any submerged object that is to be examined, while the eye of the observer is placed at the other end, which remains above water; the experiment is reported to have succeeded so well that pencil marks made on a sheet of paper were distinctly visible at a depth of about five feet below the surface of the water. There is no doubt that an instrument which would allow of instant examination of the hull of a vessel might be of great service, but of course any motion in the water would seriously affect its application.

The New Opera-House of Paris.—The exterior of the great new opera-house of Paris, or, to use its official designation, Academy of Music, was cleared of scaffolding and thrown open to public view previous to the day of the Imperial *fêtes*, the 15th ult. The ornamental portions are not yet entirely finished, but the work presents an interesting example of the kind of decorative architecture now in vogue; the general surface of the building is relieved by the introduction of marble columns and pannels, inscriptions in gold or coloured marble grounds, and gilt busts; the main lines of the building and the architecture, both of the front and side porticoes, are capped with bronze ornaments; that which crowns the parapet of the main face being gilt. The outline of the parapet of the front of the edifice is straight, but the two ends are to be surmounted by bronze groups, which are represented at present by painted substitutes. Crowds of observers are to be seen every hour of the day, contemplating the new monument of Paris, and criticising the work of the architect, M. Garnier.

Patents.

From Commissioners of Patents' Journal, August 30th.

Grants of Provisional Protection.

Animals, removing wool or hair of—2386—H. Cridland.
Bakers' ovens, heating—2348—J. Cosgrave.
Bale ties—2353—W. R. Lake.
Bed, couch, and chair combined—2338—C. F. Bower.
Boilers, preventing incrustations in—2294—H. A. Avery and G. Penabert.
Bottle racks—2384—W. Burrow.
Brewers' worts and beer, cooling—2330—C. E. Flower.
Cabs, &c.—2355—J. Day and W. Dorber.
Cages used in mine shafts, &c.—2144—J. Marley.
Capsules—2339—W. Betts.
Capsules—2340—W. Betts.
Carriages, &c., coverings for—2362—A. Leveson.
Corks, cutting—2360—J. W. Dudley.
Corsets—2358—R. Joseph.
Earth closets—2351—A. F. Baird.
Electric light—2307—F. H. Holmes.
Engines, heated air—2346—F. H. Wenham.
Eyelet and paper fastener combined—2276—C. McDermott.
Fabrics, colouring, &c.—2378—C. E. Brooman.
Fabrics, covering edges of—2323—G. and J. Pilling and F. Jennings.
Fabrics, printing woven, &c.—2336—C. Holliday.
Fabrics, woven—2349—R. Cleland and R. Cunningham.
Fire-arms, breech-loading—2328—M. F. Halliday.
Fire-arms, securing bayonets on—2335—A. M. Clark.
Fire-escapes—2354—G. Clarke.
Fire-places and stove-grates—2154—T. Prideaux.
Fluids, pumping—2334—W. B. Leachman and J. Holroyd.
Fuel, artificial—1652—N. Rausch and E. L. Darlet.
Furnaces—2337—J. A. Jones, R. Howson, and J. Gjers.
Gas—2320—H. T. Everist.
Gloves, stockings, &c.—2311—A. Turner and W. Hemsley.
Grooves, cutting—2332—T. Walker.
Iron sands for smelting, preparing titaniferous—2292—W. R. Dawson.
Iron, &c., uniting and treating—2376—W. B. Adams.
Jacquard machinery—2333—W. Turney and J. Ackroyd.
Kitchen ranges—2329—J. Badger.
Knitting frames, circular—2325—H. M. Mellor.
Lamps—2342—A. W. Williamson.
Lawn-mowing machines—2315—J. Shanks and J. Cargill.
Lees, evaporating or recovering—2327—A. Swan.
Leggings and gaiters, fastenings for—2357—H. Frankenburg and S. Phillips.
Letters, &c., sealing—2372—M. Cahen.
Machines, doubling and winding—2299—H. B. Barlow.
Machines, spinning and doubling—2364—A. Lees and W. H. Rhodes.
Manure, manufacture of—2344—J. T. Way.
Mines, preventing accidents in—2350—E. Ormerod.
Oil cake—2331—J. Fawcett.
Ordnance—2343—H. Bessemer.
Packing, manufacturing—2326—S. R. Wybrants.
Paper pulp, obtaining—2356—M. Henry.
Penholders—2309—E. Mounier.
Pianofortes—2359—T. Jackson.
Pill-making machines—2347—T. Bushby.
Quoins—2321—E. Score.
Railway points and signals—2217—J. Saxby.
Railway tickets and labels, securing—2317—W. Swenson and J. E. Heilmann.
Red colouring matter—2270—T. Luthringer.
Refrigerators—2303—A. M. Clark.
Safes—2382—E. A. Cowper.
Shackles or joining links—2301—E. Newby.
Sheep, &c., composition for destroying vermin in—2305—R. Girdwood.
Ships' screw propellers—2322—J. J. Bright.
Size for warps, &c., preparing—2314—T. Tunstill.
Spades and shovels—2380—F. and G. Parkes.
Sugar-washing apparatus—2319—G. Davies.
Sulphur, extraction of from metallic oxides—2314—A. McDougall.
Teeth, moulds for casting aluminium, &c., for artificial—2368—A. M. Clark.
Vegetable substances, obtaining fibre from—2370—F. B. Houghton.
Watches—2388—A. Cohen.
Yarns, doubling—2366—J. Holroyd and W. Fieldhouse.

Inventions with Complete Specifications Filed.

Fabrics—2407—D. Howard.
Fuzes, construction of concussion—2421—E. A. Dana.
Iron and steel, manufacturing—2420—W. R. Lake.

Patents Sealed.

582. J. G. Stidder and R. Morris.	650. W. Young and P. Brash.
587. E. T. Hughes.	661. C. Mace.
588. G. M. Garrard.	670. W. Clark.
591. J. A. Coffey.	679. R. D. Napier.
607. J. C. Martin.	698. W. Clark.
609. T. Seeley.	788. A. H. Hart and W. Parry.
620. J. R. Breckon & R. Dixon.	956. H. A. Bonneville.
621. J. G. Tongue.	974. H. A. Bonneville.
640. S. Wortley.	1586. J. F. N. B. Simons.
647. E. Lloyd.	1749. C. Sadler.
648. W. Hurrell.	

From Commissioners of Patents' Journal, September 3rd.

Patents Sealed.

596. W. E. Gedge.	660. G. H. Daw.
598. R. E. Keen.	663. M. Henry.
601. J. Marchent and J. Parker.	688. F. Ryding.
604. R. Thompson.	717. M. A. F. Mennons.
627. H. Barton and E. Whalley.	752. G. Smith.
628. W. Tomlinson.	757. T. Dunn.
631. C. W. Siemens.	758. E. Nougaret.
633. A. L. Normandy.	867. T. Wrigley.
635. E. K. Heaps and T. P. Moorwood.	1100. R. L. Hattersley.
	1172. A. Rigg.
637. A. Giles.	1240. E. Waterman.
638. H. W. Achgelis.	1558. W. Dutton.
641. P. R. Hodge.	1863. W. R. Lake.
652. S. C. Salisbury.	

Patents on which the Stamp Duty of £50 has been Paid.

2120. W. Rowden.	2159. P. M. Parsons.
2135. W. Bullough.	2145. T. Wilson.
2146. J. White.	2169. A. V. Newton.
2149. H. Bennison.	2219. C. Moriarty.

Patents on which the Stamp Duty of £100 has been Paid.

2124. H. Moore and S. Newberry.	2131. J. Hughes, W. Williams, and G. Leyshon.

Journal of the Society of Arts.

FRIDAY, SEPTEMBER 13, 1867.

Announcements by the Council.

ARTIZANS' VISITS TO PARIS.

Her Majesty's Government have transmitted to the Society of Arts, in aid of the fund raised by the Society for assisting workmen, specially selected from various trades, to visit and report on the Paris Exhibition, the sum of £500, which was granted conditionally on the Society raising a like amount by public subscription.

The amount received up to the present time is as follows :—

H.R.H. THE PRINCE OF WALES, President	£31 10 0	
Society of Arts	105 0 0	£518 14 0
Other Subscriptions	382 4 0	
HER MAJESTY'S GOVERNMENT..	500 0 0	
Total	£1,018 14 0	

Subscriptions may be forwarded to the Financial Officer, at the Society's House.

The following workmen have already been selected, and many of them are now in Paris :—

NAME.	TRADE.
Connolly, Thomas	Mason.
Lucraft, B.	Chairs and sofas.
Whiteing, Geo	Grainer and decorator.
Kay, Alexr.....	Joiner.
McEwen, J.....	Mason.
Forbes, G. B.	,,
Whiteing, Richd.	(Special reporter.)
Green, Aaron	Decorator.
Beardmore, Wm.	Potter.
Hooper, C. A.....	Cabinet maker.
Blunt, Walter.....	Leather worker.
Walker, Wm.....	Woodworking machinery.
Wilkie, Thos.	,, ,,
Booth, Laurence.....	Ribbon weaving.
Gutteridge, Joseph....	,,
Gregory, John.....	Watch trade.
Stringer, James	,,
Stanton, George	Horticulturist.
Bird, Joseph	Lace trade.
Dexter, George	,,
Smith, Edward	,,
Kendall, George.....	Hosiery trade.
Caunt, Geo.....	,,
Wilson, John	Cutlery.
Bramhall, Wm.	Saw maker.
Cooper, Samuel	Floor and wall tiles and pavements.
Coningsby, R.....	(Special reporter.)
Evans, J.....	Engineer.
Rosmüssen, P. A.	Silversmith.
Sinclair, R.	Tailor.
Bourne, W.....	Foreman, india-rubber works.
Letheren, W.	Art metal workman.
Winstanley, T. W.....	Architectural metal worker
Prior, J. D.....	Carpenter.
Mondy, E. F.	Shipwright.
Jeffery, J.....	Bricklayer.
Hughes, J. W.	Joiner.
Elliott, W.	Die-sinker.
Howell, G.	Bricklayer.
Bentley, J.	Ivory carver.
Berry, G.	Engraver.
Barrett, R.	Silver chaser.
Kirchoff, F.....	Glass painter.
Jacob, T.	Cabinet draughtsman.
Page, G.	Silversmith.
Mackie, J.	Wood carver.
Baker, R.....	,,
Genth, L.....	Bookbinder.
Randall, J.	China painter.
Oats, Francis	Mining.
Jung, H.	Watchmaker.
Bartlett, Charles.....	Plasterer.
Learmouth, W.	Engineer.
SENT FROM BIRMINGHAM.	
Taylor, J.....	Gas-fitting, chandeliers, and lamps.
Bayley, Thomas	Plumbers' brass foundry.
Gorman, William	Cabinet ,, &c.
Dry, Henry.....	General ,,
Fowler, Henry	Labour-saving machines.
Clay, John	Saddles and bridles.
Thompson, Frederick..	Harness and leather work.
Plampin, James	Jewellery and gilt toys.
Johnson, Thomas	Buttons.
Bridges, Wm.	Buttons, metal caps, tools, and metal ornaments.
Hibbs, Charles.....	Guns, &c.
Sargeant, David	Papier-maché, &c.
Archer, Thos.	Japanning.
Guise, Wm.	Needles and fish-hooks.
Pearsall, Richd.	Glass for glazing purposes, plate glass, &c.
Swene, W. S.	,, (fancy.)
Wilkinson, T. J., ...	,, (practical manipula-
Moore, Chas. W.	Die-sinking.
Poole, Edwin	Tinplate-working.
Whitehouse, Benj.	Railway carriage building.
Jackson, F.	General ornament.
Deeley, W. J.	Jewellery, with diamonds and precious stones.
Fellows, Henry	Electro-plate and plated wares.
Petit, J. L.	Steel pens.
Ansell, James	Church and other bells.
Fisher, John	Gas and other tubes.
Dodd, J.	Chandeliers and gas-fittings.

Proceedings of the Society.

FOOD COMMITTEE.

The following on the preservation of meat by means of ice, appears in a leader in the *Daily Telegraph* of the 9th Sept. :—

" Before the cattle plague ' o'ercame us like a summer cloud,' and struck down the very flower of our flocks, the British public frequently agitated the question how best to preserve fresh meat imported from abroad, and so utilise the vast herds of South American pampas and the countless sheep on Australian ' runs.' The discussion is at least half-a-dozen years old, but no progress has yet been made. Meanwhile Brother Jonathan, who said nothing whatever on the subject, was quietly making up his mind, and while we talked he acted. He has, apparently, solved the problem in a most natural and simple way, and it is perfectly amazing that the idea should not yet have been practically tested in England. The Americans have only done what every London fishmonger does with his salmon. We are informed that a car, specially prepared for the transportation of fresh

meat over long distances, is now running between Ohio and New York, and the preserving agent is ice, applied in large masses. By an ingenious contrivance, a current of air passes through the car from end to end; it is thus constantly renewed, and is always iced. The meat, being kept in a sort of Arctic temperature, remains perfectly free from even an approach to decay. Hence we are not at all surprised to learn, that when the refrigerating car had reached New York, at the end of four days' journey, its cargo of 16 steers and 123 sheep was as fresh as when killed. We are not told whether the flavour of the meat was preserved. The essential point is that a mode has now been discovered by which fresh-killed beef and mutton can be preserved for an indefinite period; the sole condition of success being an ample stock of ice. Science, which has already done so much, will certainly supply us with ice for the asking. We have thus the prospect of being able to secure importations of fresh meat from distances hitherto unattainable. If it can be kept for four days, it can, with due precautions, for forty, and that period would more than cover the gap between hungry Britain, with its many mouths, and the countries on the Plata, with their infinite resources. Let us trust that science and capital combined will some day bridge over the gap."

Proceedings of Institutions.

Yorkshire Union.—At a special meeting of the Central Council of the Yorkshire Union of Mechanics' Institutions, Mr. E. Baines, M.P., president, in the chair, it was unanimously resolved to institute an inquiry into the present means for the promotion of scientific and art education in Yorkshire, and to ascertain the opinion of the principal manufacturers and others as to what measures are required to increase and extend the means for the technical instruction of the managers and foremen of manufacturing establishments, as well as the more rudimentary scientific education of artisans. Among the instructions given by the president to Mr. Henry H. Sales, who is charged with the inquiry, are the following:—You will inquire chiefly into the instruction given in the classes of the several Institutions under these heads:—1. Design, and mechanical drawing. 2. Mathematics, especially as applied to mechanical art. 3. The principles of mechanics. 4. Chemistry, especially as applied to dyeing. You will learn distinctly whether the gentlemen whom you consult are of opinion that Mechanics' Institutions are calculated, if properly used, to effect the object in view, or whether it is essential to have some institution of a higher class, exclusively designed for scientific and art education, and supported partly (and to what extent) by the public funds. You must also endeavour to judge how far our artisans would avail themselves of the opportunities for technical education, if offered, and whether, if evening classes be insufficient, we must look to the means of supporting students during their period of study. You will also try to ascertain if it is thought that one central school would suffice for the West Riding, and whether it should be at Leeds; and then, whether the scientific classes of our Institutes should be maintained as preparatory to the higher school or college, and with certificates or exhibitions entitling the successful candidates to be admitted to the higher schools.

EXAMINATION PAPERS, 1867.

The following are the Examination papers set in the various subjects at the Final Examination held in April last:—

(*Continued from page* 649.)

GERMAN.

THREE HOURS ALLOWED.

Each candidate is expected to translate one of the extracts in Section I., to answer four of the questions in Section II., and to turn into German twelve of the sentences given in Section III. Candidates for a First Class must translate two pieces in Section I., one prose, the other poetry; answer (*e*), (*f*), and (*g*) of Section II.; render into German 17-20 inclusive of Section III., and work out the whole of Section IV.:—

Section I.

1. Mitten unter Verwundeten und Todten warf Gustav Adolph sich nieder, und die erste feurigste Siegesfreude ergosz sich in einem glühenden Gebete. Den flüchtigen Feind liesz er, so weit das tiefe Dunkel der Nacht es verstattete, durch seine Reiterei verfolgen. Das Geläute der Sturmglocken brachte in allen umliegenden Dörfern das Landvolk in Bewegung, und verloren war der Unglückliche, der dem ergrimmten Bauer in die Hände fiel. Mit dem übrigen Heere lagerte sich der König zwischen dem Schlachtfeld und Leipzig, da es nicht möglich war, die Stadt noch in derselben Nacht anzugreifen. Siebentausend waren von den Feinden auf dem Platze geblieben, über fünftausend theils gefangen, theils verwundet. Ihre ganze Artillerie, ihr ganzes Lager war erobert, über hundert Fahnen und Standarten erbeutet. Von den Sachsen wurden zweitausend, von den Schweden nicht über siebenhundert vermiszt. Die Niederlage der Kaiserlichen war so grosz, dasz Tilly auf seiner Flucht nach Halle und Halberstadt nicht über sechshundert Mann, Pappenheim nicht über vierhundert zusammenbringen konnte. So schnell war dieses furchtbare Heer zergangen, welches noch kürzlich ganz Italien und Deutschland in Schrecken gesezt hatte.

2. Wie, Sire, ist das die Sprache eines Königs?
Gibt man so eine Krone auf? Es setzt
Der Schlechtste deines Volkes Gut und Blut
An seine Meinung, seinen Hasz und Liebe;
Partei wird Alles, wenn das blut'ge Zeichen
Des Bürgerkrieges ausgehangen ist.
Der Ackersmann verlaszt den Pflug, das Weib
Den Rocken, Kinder, Greise waffnen sich,
Der Bürger zündet seine Stadt, der Landmann
Mit eignen Händen seine Saaten an,
Um dir zu schaden oder wohl zu thun
Und seines Herzens Wollen zu behaupten.
Nichts schont er selber und erwartet sich
Nicht Schonung, wenn die Ehre ruft, wenn er
Für seine Götter oder Götzen kämpft.
Drum weg mit diesem weichlichen Mitleiden,
Das einer Königsbrust nicht ziemt.—Lasz du
Den Krieg ausrasen, wie er angefangen.
Du hast ihn nicht leichtsinnig selbst entflammt.
Für seinen König musz das Volk sich opfern,
Das ist das Schicksal und Gesetz der Welt.
Der Franke weisz es nicht und will's nicht anders.
Nichtswürdig ist die Nation, die nicht
Ihr Alles freudig setzt an ihre Ehre.

3. Des Atreus ält'ster Sohn war Agamemnon:
Er ist mein Vater. Doch ich darf es sagen,
In ihm hab' ich seit meiner ersten Zeit
Ein Muster des vollkommnen Manns gesehn.
Ihm brachte Klytämnestra mich, den Erstling
Der Liebe, dann Elektren. Ruhig herrschte
Der König, und es war dem Hause Tantals
Die lang' entbehrte Rast gewährt. Allein
Es mangelte dem Glück der Eltern noch
Ein Sohn, und kaum war dieser Wunsch erfüllt
Dasz zwischen Schwestern nun Orest
Der Liebling wuchs, als neues Uebel schon
Dem sichern Hause zubereitet war.
Der Ruf des Krieges ist zu euch gekommen,
Der, um den Raub der schönsten Frau zu rächen,
Die ganze Macht der Fürsten Griechenlands
Um Trojens Mauern lagerte. Ob sie
Die Stadt genommen, ihrer Rache Ziel
Erreicht, vernahm ich nicht. Mein Vater führte
Der Griechen Heer. In Aulis harrten sie
Auf günst'gen Wind vergebens; denn Diane,
Erzürnt auf ihren groszen Führer, hielt

Die Eilenden zurück und forderte
Durch Kalchas' Mund des Königs ält'ste Tochter.
Sie lockten mit der Mutter mich ins Lager;
Sie riszen mich vor den Altar und weihten
Der Göttin dieses Haupt.

4. Als Ludwig XII. im Jahre 1515 starb, folgte ihm der jugendlich kühne und ehrgeizige Franz. I. auf dem Französischen Throne; und um seine Regierung mit einer glänzenden That zu beginnen, brach er noch in demselben Jahre mit einem Heere nach Italien auf und eroberte Mailand wieder. Die Schweizer, welche der Stadt zu Hülfe kamen und sich unvorsichtig in ein Treffen einlieszen, wurden bei Marignano nach zwei heiszen Tagen besiegt. Es war die erste grosze Schlacht, die sie gänzlich verloren. Das französische Geschütz und die deutschen Lanzenknechte, die im französischen Solde dienten und von nun an als das beste Fuszvolk galten, gewannen den Sieg. Der Kaiser Maximilian zog zwar im folgenden Jahre noch einmal nach Italien und belagerte Mailand, allein sein Alter und so viele miszlungene Bestrebungen machten ihn zum Frieden geneigt; überdiesz schmolz sein Heer aus Mangel des Soldes schnell zusammen; er überliesz in dem Vergleich zu Brüssel im Jahre 1516 das Herzogthum Mailand dem französischen Könige und gab, was ihm fast noch empfindlicher war, der verhaszten Republik Venedig die wichtige Festung Verona zurück. So endigte sich nach vielfachem Wechsel der Streit in Italien, auf welchen Maximilian seine beste Kraft hatte verwenden müssen.

SECTION II.—GRAMMAR AND IDIOMS.

(a.) Show the derivation and meaning of every part of which the following are composed:—*Unaussprechliches, unwiderruflich, anbetungswürdig, bemerkenswerth.*

(b.) State the second person singular indicative in every tense of *haben* and *sein.*

(c.) Decline in every case, singular and plural, the German of—That rich man. Our beautiful land. Cold night.

(d.) Give the definite article with each of the following substantives, in the genitive singular, and the dative plural:—*Maus, Tochter, Haufe, Vetter, Bach, Wald.*

(e.) Give three examples where in English the passive, in German the reflective verb is used.

(f.) Conjugate the present and perfect of—*Dürfen, nehmen, bleiben, tragen, sehen.* Add also the first person singular of the imperfect and the participle past.

(g.) Was hat's gegeben?
Ich will dir Beine machen.
Er soll in sich gegangen sein.
Sie haben das Hasenpanier ergriffen.
Es ging bunt her.
Meinetwegen; was geht das mich an?
Der wird nie auf einen grünen Zweig kommen.
Er ist so blutjung und hat sich schon versprochen.
Das steht mir ganz und gar nicht an.
Er hat ihm ein X für ein U gemacht.
Ich kann mir das nicht zusammenreimen.
Das sind wahre Sonntagskinder.

SECTION III.

[The writing, either in English or German characters, must be thoroughly legible and distinct.]

1. I did not see those people you spoke of.
2. Were there many persons in the theatre?
3. The half of one-eighth is one-sixteenth.
4. One morning they were obliged to leave the town.
5. Do come to us to-morrow morning.
6. Who of us is to fetch your cloak?
7. Is that a cousin of yours or of hers?
8. With all his riches he could never be content.
9. At the appointed hour, he said, he would come to meet us.
10. He offered us a glass of wine.
11. He would sit down and write the whole morning.
12. Having sat down, he began to tell us a story.
13. What sort of house does he now live in?
14. We had never been told how that happened.
15. I could not believe that he had acted thus.
16. He wished me to go to his father and tell the circumstance.
17. How to express our thoughts we hardly know.
18. Had I been in your place, I would have acted differently.
19. Can you tell me, who has done this?
20. 1685. At the head of the English watering places, without a rival, was Bath. The springs of that city had been renowned from the days of the Romans. It had been, during many centuries, the seat of a bishop. The sick repaired thither from every part of the realm. The king sometimes held his court there. Nevertheless, Bath was then a maze of only four or five hundred houses, crowded within an old wall, in the vicinity of the Avon. Pictures of what were considered as the finest of those houses are still extant, and greatly resemble the lowest rag-shops and pot-houses of Radcliffe-highway. Even then, indeed, travellers complained of the narrowness and meanness of the streets. That beautiful city, which charms even eyes familiar with the masterpieces of Bramante and Palladio, and which the genius of Anstey and of Smollet, of Frances Burney and of Jane Austen, has made classic ground, had not begun to exist.

SECTION IV.

Questions on German History and Literature.

(a.) State the years of the reign of Maximilian I.

(b.) What was the league of the "Bundschuh," and "Des armen Kunzen?"

(c.) By what great discoveries is the close of the middle ages distinguished?

(d.) Who was Ulfila? When did he live? What has made him renowned?

(e.) What is the character of alliterative poetry, and when did it flourish?

(f.) What did Otfrid write?

Give, in German, a description of the destruction of a large warehouse by fire.

(To be continued.)

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

DUNDEE, 1867.

The following is a list of the Papers read in the different Sections:—

THURSDAY, SEPTEMBER 5TH.

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

W. R. Birt—Report of Lunar Committee.

J. Glaisher—Some Remarks on the Original Objects and General Work of the Lunar Committee.

J. Clerk Maxwell—On a Real Image Stereoscope, with Illustrations of Solid Geometry.

Balfour Stewart—On the Behaviour of the Aneroid Barometer at Different Pressures.

Sehnor Capello—A comparison of the Kew and Lisbon Magnetic Curves during the Disturbance of February 20—25, 1866. Communicated by Dr. Balfour Stewart.

Rev. R. Harley—On a Certain Cyclical Symbol.

James Lindsay (the late)—Proof of the Binomial Theorem. Communicated by W. B. Grant.

F. W. Moffatt—On Meteorological Observations at Sea. Communicated by Dr. Moffatt.

J. Moffatt, M.D.—Experiments on the Luminosity of Phosphorus.

Dr. T. L. Phipson—On the Phenomena which occur when Magnetized Steel is Dissolved in Acids.

SECTION B.—CHEMICAL SCIENCE.

President's Address.

A. R. Catton—Report on the Synthesis of Certain Organic Acids.

A. R. Catton—On the Synthesis of Formic Acid.
J. A. Wanklyn and R. Schenk—On the Synthesis of Caproic Acid.
J. A. Wanklyn—Action of Sodium on Valerianic and similar Ethers.
P. T. Main and A. R. Catton—On a new Synthesis of Ammonia.
J. Spiller—On the Decay of Stone.
W. Weldon—On the Regeneration of the Oxide of Manganese.

Section C.—Geology.

President's Address.
Robert Chambers, LL.D., F.R.S.E.—Notice of an "Esker" at St. Fort.
D. Milne Home—On the Old Sea Cliffs and Submarine Banks of the Firth of Forth.
E. A. Wünsch—On some Carboniferous Fossil Trees embedded in Trappean Ash, in the Isle of Arran.
Professor Harkness and Dr. H. A. Nicholson—On the Coniston Group of the Lake District.
Dr. H. A. Nicholson—On the Graptolites of the Skiddaw Slates.
Dr. H. A. Nicholson—On the Nature and Systematic Position of the Graptolitidæ.
R. H. Scott—Preliminary Report of the Committee for the Exploration of the Plant Beds of North Greenland.

Section D.—Biology (Department of Zoology and Botany).

Opening Address by the President of the Section.
C. Spence Bate—Report on the Fauna and Flora of the Southern Coasts of Devon and Cornwall.
J. Gwyn Jeffreys—Fourth Report on Dredging among the Shetland Isles.
Dr. Mörch—Notice of Dredging by the late Dr. Möller, off Fair Isle.
Dr. M'Intosh—Remarks on Mr. Gwyn Jeffreys' Collection of Hebridean Annelids.
Dr. C. Collingwood—On Palagic Floating Animals observed at Sea.
Dr. C. Collingwood—Notes on Oceanic Hydrozoa.
Dr. Anton Dohrn, of Jena—On the Morphology of the Arthropoda.

Section D.—Biology (Department of Anatomy and Physiology).

Professor Bennett—New Investigations to determine the Amount of the Bile secreted by the Liver, and how far this is influenced by Mercurials.
Professor Turner and Dr. M. Foster—To exhibit some preparations of the finest Bile Ducts.
Dr. Davy—On the Influence of Air on Vital Action as tested by the Air-pump.
Dr. G. Robinson—On certain Effects of the Concentrated Solar Rays upon the Tissues of Living Animals immersed in Water.
Dr. W. B. Richardson—On Coagulation of the Blood—a correction of the Ammonia Theory.

Section E.—Geography and Ethnology.

The President's Address.
Lieut. S. P. Oliver, R.A.—Two Routes through Nicaragua.
Mrs. Lynn Linton—The Ethnography of the French Exhibition.
Capt. Murray, U.S.N.—On the Physical Geography of Nicaragua.
J. Crawfurd—Food of the Aborigines of Australia.

Section F.—Economic Science and Statistics.

The President's opening Address.
Report of Committee on Uniformity of Weights, Measures, and Coins.
James Yates—Reasons why the Office of Warden of the Standards should include Standard Weights and Measures of the Metric System in addition to those of the Imperial Weights and Measures.
Sir John Bowring—On Productive Labour in Prisons as associated with the Reformation of Criminals.
James Oldham—On the Utilisation or more Profitable Employment of Male Convicts.

Section G.—Mechanical Science.

President's Address.
Report of Steamship Committee.
J. V. N. Bazalgette—On an improved "Tourists'" or "Local Topographical Indicator."
Joseph Mitchell, C.E.—On the Construction and Works of the Highland Railway.
John Fernie—On the Iron and Steel at the Paris Exhibition.
David Greig—On Steam Cultivation.

FRIDAY, SEPTEMBER 6TH.

Section A.—Mathematical and Physical Science.

J. Glaisher—Report on Luminous Meteors.
Sir D. Brewster—On the Colours of Soap Bubbles.
Sir D. Brewster—On the Figures of Equilibrium in Liquid Films.
Sir D. Brewster—Notice respecting a Haystack struck with Lightning at Dun, in Forfarshire.
Dr. Everett—On the Results of Observations of Atmospheric Electricity at Kew, and Windsor, Nova Scotia.
W. Ladd—On a Dynamo-Magnetic Machine.
W. Ladd—On a Magneto-Electric Machine.
Sir W. Thomson—Electric Machines founded on Induction and Convection.
Professor Rankine—On the Approximate Drawing of Circular Arcs of Given Lengths.
Rev. R. Harley—On Finite Solutions of Algebraical Equations.
Hon. J. Cockle—On the Inverse Problem of Coresolvents, communicated by Rev. R. Harley.
A. Claudet—A New Fact of Binocular Vision.
A. Claudet—On a Mechanical Means of Producing the Differential Motion required to Equalise the Focus for the Different Planes of a Solid.

Section B.—Chemical Science.

Lauder Lindsay—On the Present Uses of Lichens as Dye Stuffs.
J. Alfred Wanklyn—On the Existence of Putrescible Matter in River and Lake Waters.
Dugald Campbell—A Note on Messrs. Wanklyn, Chapman, and Smith's Method of Determining Nitrogenous Organic Matters in Water.
A. E. Fletcher—On an Ether Anemometer for Measuring the Speed of Air in Flues and Chimneys.
A. E. Fletcher—On a Self-Registering Perpetual Aspirator.
G. Ansell—On an Apparatus for Indicating the Pressure and Amount of Fire Damp in Mines.
Professor Lawson—Notes of the Analyses of Gold Coins.

Section C.—Geology.

J. Wyatt—On the Gradual Alteration of the Coast Line in Norfolk.
George Maw—On the Cambrian Rocks of Llanberis, with reference to a Break in the Conformable Succession of the Lower Beds.
Dr. Oldham—On the Geology of India.
The President—An Account of the Process of the Geological Survey of Scotland.
H. Woodward—Third Report on Fossil Crustacea.
F. M. Burton—On the Lower Lias, and Traces of an Ancient Rhætic Shore in Lincolnshire.
J. E. Taylor—On the Norfolk Chalk-marl.
H. S. Ellis—On the Mammalian Remains from the Submerged Forest in Barnstaple Bay, Devonshire.

SECTION D.—BIOLOGY (DEPARTMENT OF ZOOLOGY AND BOTANY).

Dr. Cobbold—Remarks on the Entozoa of the Common Fowl and of Game Birds, in their supposed relation to the Grouse Disease.

E. Ray Lankester—Note on the Boring of Limestone by certain Annelids.

A. Murray—On the Future Administration of the Natural History Collections of the British Museum.

Sir J. Lubbock—On some Points in the Anatomy of Thysanura.

Dr. Lauder Lindsay—Is Lichen-growth any criterion of the Age of Pre-historic Structures?

Dr. Lauder Lindsay—Is Lichen-growth detrimental to Forest and Fruit Trees?

Dr. Maxwell T. Masters—On Polliniferous Ovules in a Rose *(Rosa arvensis)*.

Charles Martins—To Exhibit Specimens of the Air-Bearing Roots of *Tussiæa repens*, and Specimens of the Plant cultivated under different Biological Conditions.

Dr. Heaton—On certain Simulations of Vegetable Growths.

W. P. Hiern—On the Occurrence of *Aster salignus*, Willd., in Wicken Fen, Cambridgeshire.

Professor Dickson—To Exhibit an Abnormal Leaf of Prunus Lauro-cerasus.

SECTION D.—BIOLOGY (DEPARTMENT OF ANATOMY AND PHYSIOLOGY).

Professor C. Martins—To Exhibit Osteological Preparations, with Photographs, to illustrate the Comparison of Limbs deduced by the Torsion of the Humerus.

Dr. Ogilvie—On the Adaptation of the Structure of the Shell of the Bird's Egg to the Function of Respiration.

Professor Turner—A Contribution to the Anatomy of the Pilot Whale.

Sir Duncan Gibb—Vocal and other Influences upon Mankind of the Pendency of the Epiglottis.

Dr. M'Intosh—Notes of Experiments with Poisons, &c., on Young Salmon.

Professor Bennett—On Protagon in Relation to the Molecular Theory of Organisation.

Dr. B. W. Richardson—On Some Effects produced by Applying Extreme Cold to certain Parts of the Nervous System.

SECTION E.—GEOGRAPHY AND ETHNOLOGY.

Captain C. W. Wilson—Report of the Palestine Exploration Fund.

Captain C. W. Wilson—Recent Discoveries in and around the Site of the Temple at Jerusalem.

Lieutenant Anderson—Notes of a Reconnaisance of Some Portions of Palestine.

Rev. H. B. Tristram—On the Districts of Palestine as yet imperfectly Explored.

Sir R. I. Murchison—Observations on the Livingstone Search Expedition now in progress.

Professor D. T. Ansted—The Lagoons of Corsica.

Major R. Stuart, C.B.—The Wallachs of Mount Pindus.

SECTION F.—ECONOMIC SCIENCE AND STATISTICS.

Professor Leone Levi—On the Condition and Progress of Scotland in Relation to England and Ireland in Population, Education, Wealth, Taxation, Crime, Consumption of Spirits, Savings Banks, &c.

Report of the Committee on the "Uniformity of Weights, Measures, and Coins" (so far as it relates to Coins).

Frank P. Fellowes—On the various Methods in which our Coinage may be Decimalized; the Advantages and Disadvantages of each.

Henry J. Ker Porter—On the Prevalence of Spedalske or Leprosy in the Kingdom of Norway.

SECTION G.—MECHANICAL SCIENCE.

Rev. Patrick Bell—On Reaping Machines.

Professor J. Clerk Maxwell—On the Theory of Diagrams of Forces as applied to Roofs and Bridges.

George Fawcus—On the Stowage of Ships' Boats.

George Maw—Covered Life Boats.

Professor Macdonald—On the Construction of the Life Boat.

John Halliday—On the Heating of Hot Houses.

Wm. Paterson—On the Consumption of Fuel.

J. D. Everett, D.C.L.—On the Rigidity of Glass, Steel, and Brass.

SATURDAY, SEPTEMBER 7TH.

SECTION E.—GEOGRAPHY AND ETHNOLOGY.

J. Crawfurd, F.R.S.—On the Antiquity of Man.

P. N. Compton—On the Coasts of Vancouver's Island and British Columbia.

J. J. Pratt—On the Colony of New Scotland.

J. Crawfurd, F.R.S.—On the Complexion, Hair, and Eyes as the Tests of the Races of Man.

J. Crawfurd, F.R.S.—On the supposed Aborigines of India, as distinguished from its Civilised Inhabitants.

H. H. Howarth, F.E.S.—On some Changes of Surface affecting Ancient Ethnography.

Captain Bedford Pim, R.M.—On the Mining District of Chontales, Nicaragua.

MONDAY, SEPTEMBER 9TH.

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

G. J. Symons—Report of the Rainfall Committee.

Alexander Brown—Observations of the Rainfall at Arbroath.

John Thruston—On Evaporations from Rain Gauges.

Colonel Sykes—On Storm Warnings, their importance and practicability.

George Forbes—On the Meteor Shower of August, 1867.

Sir D. Brewster—On the Colours of Films of Alcohol.

Sir D. Brewster—On the Radiant Spectrum.

Sir D. Brewster—Notice respecting Mr. Macrae's Photographs upon Glass and Porcelain.

A. Claudet—Photographic Portraits obtained by Single Lenses of Rock Crystal and Topaz.

SECTION B.—CHEMICAL SCIENCE.

A. Crum Brown—Remarks on the Calculus of Chemical Operations.

Maxwell Simpson—On the Formation of Succinic Acid from Ethylidine.

Maxwell Simpson and Gautier—On a Compound formed by the direct union of Anhydrous Prussic Acid and Aldehyde.

A. R. Catton—On Loewig's Researches on the action of Sodium Amalgam on Oxalic Ether.

I. Lowthian Bell—On a method of recovering Sulphur and Oxide of Manganese, used at Dieuze, near Nancy, France.

J. H. Gladstone—On the Refraction Equivalent of Salts in Solution.

J. Spiller—On certain New Processes of Photography.

W. Crookes—On a new Polarizing Photometer.

SECTION C.—GEOLOGY.

W. Pengelly—Third Report of the Committee for the Exploration of Kent's Cavern, Devonshire.

Professor Ansted—On the Conversion of Stratified Rock into Granite in the North of Corsica.

Dr. Julius Schvarcz—On the Internal Heat of the Earth.

Dr. C. Le Neve Foster—On the Preseberg Iron Mines, Sweden.

F. Gordon Davis—On the Calamine Deposits of Sardinia.

Dr. C. Collingwood—On the Geology of the North of Formosa.

Dr. C. Collingwood—Notes on the Geology of the Islands around the north part of Formosa.

Section D.—Biology (Department of Zoology and Botany.)

W. Carruthers—On British Fossil Cycadeæ.

A. R. Wallace—On Birds' Nests and their Plumage, or the relation between Sexual Differences of Colour and the mode of Nidification in Birds.

Dr. Collingwood—Observations on the Habits of Flying Fish.

Dr. Collingwood—On Trichodesmium, or Sea Dust.

Professor Allman—Notes on the Structure of certain Hydroid Medusæ.

Dr. M'Intosh—Report on the Marine Fauna of St. Andrews.

Dr. M'Intosh—The Annelidæ of St. Andrews.

W. Stephen Mitchell—Report on the Leaf Beds of the Lower Bagshot Beds of Hants and Dorset.

W. Brown—On the claims of Arboriculture as a Science.

Section D.—Biology (Department of Anatomy and Physiology).

Dr. B. W. Richardson—Report on Methyl Compounds.

E. Ray Lankester—Observations with the Spectroscope on Animal Colouring Matters.

Professor Allen Thomson—Exhibited Microscopical Preparations of the Cochlea, of the Retina, and of Teeth of Fossil Fishes.

Dr. Polli—On the Antiseptic Properties of the Sulphides.

Professor Cleland—On the Epithelium of the Cornea of the Ox in relation to the growth of Stratified Epithelium.

Professor Cleland—On some points connected with the Joints and Ligaments of the Hand.

Section E.—Geography and Ethnology.

Sir John Lubbock, Bart., F.R.S.—On the Origin of Civilization and the Early Condition of Man.

Messrs. Wallace and Mayne—A Peruvian Expedition to the River Ucayali.

Dr. Collingwood—A Boat Journey round the Northern end of Formosa.

Dr. John Davy—On the Character of the Negro, chiefly in relation to Industrial Habits.

T. Baines—On Wallfish Bay and the Ports of South Africa.

J. Crawfurd, F.R.S.—On the Dissemination of the Arabian Race and Language.

H. H. Howarth, F.E.S.—On the Origines of the Norsemen.

H. C. Criswick—Life amongst the Veys.

Section F.—Economic Science and Statistics.

Alex. J. Warden—On the Linen Manufacture of Dundee.

James G. Orchar—On the Engineering Trade of Dundee.

Henry Gourlay—On the Iron Shipbuilding of Dundee.

James Yeaman—On the Seal and Whale Fisheries of Dundee.

Frank Henderson—On the Leather Manufacture of Dundee.

C. C. Maxwell—On the Confectionary and Marmalade Trade of Dundee.

A. Robertson—Statistics of the Social Condition of Dundee.

E. Renals—On Arbitration in the Nottingham Hosiery Manufacture.

Dr. Lauder Lindsay—On the Obstacles to the Utilization of New Zealand Flax.

A. Stephen Wilson—On the Measure and Value of Oats.

Section G.—Mechanical Science.

Report of the Committee on the Patent Laws.

Wm. Fairbairn, C.E., LL.D., &c.—Report on Experimental Researches on the Mechanical Properties of Steel in its present improved State of Manufacture.

G. B. Galloway—On the Application of the Funds derived from Patent Fees.

General Haupt, U.S. America—On the Application of Machinery to Boring and Tunnelling.

Dr. C. Le Neve Foster—An account of Bergstroem's Boring Machine used at the Preseberg Mines, Sweden.

Joseph Mitchell, C.E., F.R.S.E.—On a New Mode of Constructing the Surface of Streets and Thoroughfares.

Latimer Clark, C.E.—On the Birmingham Wire Gauge.

TUESDAY, SEPTEMBER 10TH.

Section A.—Mathematical and Physical Science.

C. Meldrum—On the Meteorology of the Mauritius.

C. Meldrum—On the Hurricanes of the Indian Ocean.

F. Jenkin—Report of the Committee on Electrical Standards.

J. P. Joule—Determination of the Mechanical Equivalent of Heat, from Experiments on the Heat Evolved by Currents of Electricity.

C. W. Siemens—On a Resistance Measurer.

J. Jenkin—On a Modified Form of Siemen's Resistance-measurer.

C. Hockin—Examination of the Permanency of the Standard Resistance Coils to be deposited at the Kew Observatory.

Sir William Thomson—On a Series of Electrometers for Comparable Measurements through great range.

W. Hooper—On the Electrical Induction of Hooper's Insulated Wires.

Thomas Stevenson—Notice of a proposal to illuminate Beacons and Buoys at Sea by Electricity conveyed by Submarine Wires connected with the Shore.

T. Archer Hirst—On the alleged Correspondence between Newton and Pascal recently communicated to the French Academy.

Sir David Brewster—On the alleged Correspondence between Pascal and Newton. (The letters of Newton were exhibited.)

Sir Wm. Thomson—On Volta-convection by Flame.

Sir Wm. Thomson—On a Self-acting Electrostatic Accumulator.

Sir Wm. Thomson—On a Uniform Electric Current Accumulator.

Bierens de Haan—On a Theorem in the Integral Calculus.

B. Davis—A list of 5,500 Prime Numbers.

A. R. Catton—On the Laws of Symmetry of Crystalline Forms.

A. R. Catton—A Contribution towards the Expression of the Angle between the Optic Axes of a Crystal in terms of the Angles between the Faces.

A. R. Catton—On the Theory of Double Refraction, with special reference to the Influence of the Material Molecules on the Propagation of Light in Crystals.

N. de Khanikof—Experiments for the Verification of the Law of Henry and Dalton on the Absorption of Gases by Liquids.

Section B.—Chemical Science.

I. Lowthian Bell—On the Present State of the Manufacture of Iron in Britain, and its position as compared with that of some other countries.

J. B. Lawes and J. H. Gilbert—Preliminary Notice of Results on the Composition of Wheat, grown for Twenty Years in succession on the same Land.

R. F. Smith—On the Gaseous Products of the Destructive Distillation of Hydro-carbons, obtained from Shales and Coals at Low and High Temperature.

P. Spence—On the Economisation of the Sulphurous Acid in Copper Smelting.

W. L. Scott—On the Bisulphite of Calcium as a Preservative of Animal Substances.

W. L. Scott—Note on the Artificial Production of Oil of Cinnamon.

T. T. P. Bruce Warren—On the Electrical Resistances of the Fixed and Volatile Oils.

SECTION C.—GEOLOGY.

Mr. R. Slimon's Collection of Crustacea will be Exhibited in this Section.

W. Carruthers—Enumeration of British Graptolites.

E. Hull—On the Structure of the Pendle Range, Lancashire, as illustrating the South-Easterly Attenuation of the Carboniferous Sedimentary Rocks of the North of England.

W. S. Mitchell—Second Report on the Alum Bay Leaf Bed.

E. Hull—Observations on the Relative Geological Ages of the Principal Physical Features of the Carboniferous District of Lancashire.

W. Carruthers—On British Fossil Cycadeæ.

W. Carruthers — On Calamiteæ and Fossil Equisetaceæ.

Professor Charles Martins—On the Ancient Glacier of the Valley of Argelez, in the Pyrenees (read in French by the author).

P. W. Stuart Menteath—On Tertiary and Post-tertiary Action in the Pyrenees.

C. W. Peach—On New Fossil Fishes from Caithness and Sutherland.

E. Ray Lankester—On some New Cephalaspidean Fishes.

J. F. Walker—On a New Phosphatic Deposit.

Captain F. Brome—Notice of Recent Discoveries in Caves of Gibraltar, communicated by G. Busk, F.R.S.

Prof. Ansted—On the Lagoons of Eastern Corsica.

Rev. W. H. Crosskey—Notes on the Relation of the Glacial Shell Beds of the Carse of Gowrie to those of the West of Scotland.

John Plant—On the Geology and Fossils of the Lingula Flags at Upper Mawddach, North Wales.

Rev. J. Gunn—On Tertiary and Quarternary Deposits in the Eastern Counties, with reference to Periodical Oscillations of Level and Climate.

SECTION D.—BIOLOGY (DEPARTMENT OF ZOOLOGY AND BOTANY).

Rev. A. Merle Norman—Preliminary Report on the Crustacea, Molluscoida, and Cœlenterata, procured by the Shetland Dredging Committee in 1867.

Professor Newton—Supplement to Report on the Didine Birds of the Mascarene Islands.

E. J. Lowe—On the abnormal forms of Ferns.

Prof. Balfour—Notice of some rare Plants recently collected in Scotland.

Dr. Fraser—On the occurrence of a new British Moss in Dovedale.

Dr. Collingwood—On the remarkable Marine Animals observed in the China Seas.

E. Ray Lankester—On the Anatomy of *Patella*.

H. Alleyne Nicholson—On the Nature and Zoological Position of the Graptolidæ.

Dr. Grierson—On the Destruction of Plantations at Drumlanrig by a species of Vole.

Rev. H. B. Tristram—On the Zoological Aspects of the Grouse Disease.

Dr. Lauder Lindsay—On the Conservation of Forests in our Colonies.

Sir James E. Alexander—On the Preservation of Fishing Streams.

C. W. Peach—On Naked-eyed Medusæ, from Peterhead, Wick, and other British Localities, including some new species.

C. W. Peach—On the Fructification of Griffithsia Corallina, found in the West Voe, at the Out Skerries, Shetland.

SECTION D.—BIOLOGY (DEPARTMENT OF ANATOMY AND PHYSIOLOGY).

Dr. C. Collingwood—A new Form of Cephalopodous Ova.

Professor Cleland—To exhibit Microscopical Preparations of the Nerves of the Cornea.

Professor Turner—To exhibit Microscopical Preparations in illustration of the Minute Anatomy of the Nervous System.

Wentworth L. Scott—On the presence of Quinine and other Alkaloids in the Animal Economy.

Dr. Polli—On the Antiseptic Properties of the Sulphides.

R. Dunn—On the Phenomena of Life and Mind.

P. Melville—Life: its Nature, Origin, &c.

SECTION E.—GEOGRAPHY AND ETHNOLOGY.

Sir R. I. Murchison, Bart., K.C.B.—Announcement of the International Prehistoric and Anthropological Congress for 1867.

M. Lucien de Puydt—Exploration of the Isthmus of Darien, with a view of discovering a Practicable Line for a Ship Canal.

J. Crawfurd, F.R.S.—On the supposed Plurality of the Races of Man.

Cyril Graham, F.R.G.S.—On Exploration in Palestine to the east of Jordan, and on future intended Operations.

J. W. Barnes, C.E.—Exploration of Belochistan and Scind, with a view of an examination of the Subterranean Supply of Water.

J. Crawfurd, F.R.S.—On the History and Migration of Saccharifierous or Sugar-yielding Plants in reference to Ethnology.

W. Perkins—Exploration of the Grand Chaco in La Plata, with an account of the Indians.

Antonio Raimondi—Account of the Wild Indians inhabiting the Forests in the interior of Huanta, Peru, with observations on their Crania compared with those of ancient races.

SECTION F.—ECONOMIC SCIENCE AND STATISTICS.

Professor E. T. Rogers—On the Funds available for Developing the Machinery of Education.

Colonel Sykes, M.P.—Analyses of the Report upon the State of the Empire of France, presented to the Senate and Legislative Body, February, 1867. *(Exposition de la situation de l'Empire, presenté au Senat et au Corps Legislatif. Fevrier*, 1867.*)*

Dr. Cuthbert Collingwood—On the Consumption of Opium.

P. H. Thoms — Observations on Community of Language, and Uniformity of Notation, Weights, Measures, and Coinage.

P. M. Tait—On the Population and Mortality of Calcutta.

Patrick Matthew—Employer and Employed—Capital and Labour.

SECTION G.—MECHANICAL SCIENCE.

James K. Caird—On an Iron Camb for Power Looms.

Admiral Sir E. Belcher, K.C.B.—On the Methods for Testing the Speed of Vessels over the Measured Mile.

James R. Napier, F.R.S., and W. J. Macquorn Rankine, C.E., LL.D., &c.—On Moveable Seats for Slide Valves.

Ferdinand Kohn—On Iron and Steel at the Paris Exhibition.

R. Lewis—On an Improved Marine Steam Boiler.

J. Eckersley—On J. R. Swan's Improved Calcining Kilns.

S. J. Mackie—On Iron Floating Forts, Iron Harbours, and other Floating Structures; and on Daft's Method of Construction of Iron Fabrics.

A. S. Hallidie, C.E.—On an Improved Suspension Bridge.

Professor Macdonald—On an Improved Paddle Wheel.

Wm. Hooper—Electrical Induction.

W. W. Urquhart—On some of the Difficulties the Scientific Engineer meets with in practice.

WEDNESDAY, SEPTEMBER 11th.

Section A.—Mathematical and Physical Science.

C. Wheatstone—On a New Telegraphic Thermometer, and on the Application of the Principle of its Construction to other Meteorological Indicators.

Major Tennant—On Preparations for Observing the Total Solar Eclipse of August 18th, 1868.

R. Russell—On some Deductions by Dr. Tyndall from his recent Experiments regarding the Radiant and Absorptive Properties of Vapour in the Atmosphere.

PARIS EXHIBITION.

The independent competitive trial of steam ploughs, which has already been mentioned in the *Journal*, is appointed to take place on the 19th and 20th of the present month, at Petit-Bourg, on the farm of M. Decauville, a distinguished agriculturist, and at the same time will be tried any kind of sub-soil or other ploughs which turn over or penetrate the earth to the depth of 35 centimetres (14 inches). A considerable number of French and English ploughs are already entered, including the double Brabants of MM. Kondeur and Iscultz frères, the Contgreade and Tweedale ploughs, the subsoil plough of Dombasle of Nancy, the ploughs of Grignon and Bonnet of Avignon, and Howard's great plough. The lists will be open until the 18th instant. The jury will note the depth of the furrows, the extent of surface acted upon, the time occupied by each implement including preparation for the work, the quantity of fuel consumed, the power employed, the number of men and of horses or oxen engaged, the nature of the soil, and any other circumstances which may aid in estimating the cost and quality of the work done. The first day will be devoted to the labours of the jury, and on the second the public will be admitted; the terms and conditions of the competitions are not yet published. Petit-Bourg is not quite an hour's journey from Paris, either by the Lyons or Orleans railway. It is reported that, in consequence of these free competitive trials, the Imperial Commission has renounced its trials altogether; but, if so, there will be an unfortunate blank in the official list of awards at the Exhibition.

A new cooking apparatus, or rather a partially new method of cooking, has appeared in the park of the Exhibition, and has created a great sensation. It is the invention of a Norwegian, and comes with certificates of recommendation from one of the Ministers of Sweden and Norway. The principle is explained in a few words, and anyone may try the efficiency of the system for himself without difficulty; the meat or vegetable to be boiled or stewed is placed in a saucepan with a well-fitting cover but without a handle, and left on the fire for five minutes only after it has attained the boiling point; it is then placed in a box thickly padded on all sides with felt or hair, and, the heat escaping very slowly indeed, the cooking continues. The apparatus is in daily operation, the viands being boiled for five minutes over a gas stove, sealed up in one of the boxes and opened in presence of the public two hours or so afterwards. One of the proposed applications of the invention is cooking for armies or for travellers, and another is the keeping cooked dishes hot for a long period; at the end of eighteen hours the contents of the saucepans are still hot and the flavour of the preparations, it is said, uninjured. It is stated that the system is adopted on board Norwegian and other ships, the economy in water being 20 per cent. besides the immense saving of fuel. This curious invention brings to mind the old query, whether an egg of which the shell is whole gets harder in consequence of the enclosed heat, and seems to answer it in the affirmative; if an egg were boiled for, say, three minutes, then wrapped up in any non-conducting substance and left there for an hour or so, it would supply an illustration on a small scale of the principle of the new system.

As in the case of former great exhibitions, there is a strong disinclination to see the building in the Champ de Mars, or at any rate the great outer circle, destroyed, and one of the proposals put forth for its application merits attention apart from the immediate question. M. Brissac, an engineer, suggests that the present machinery gallery should be converted into a mechanical atelier, with steam or other motive engines of 2,000 horse-power, for the convenience of small manufacturers, and he calculates that thus arranged it would bring an annual rent of about £150,000. The Imperial Commission, in announcing the positive closing of the exhibition on the 31st October, invites tenders for the purchase of the building and materials, to be sent in by the end of the present month. There is also a rumour circulated that the building will be purchased by the Government, and applied to the purposes of a new ministry, which will include the postal and telegraphic services and the Imperial printing establishment.

SUEZ CANAL.

(*Continued from page* 652).

Never before have such extensive earth-works—above all, 500 leagues from Europe, in completely desert country—been undertaken. Not long since, Paris saw the work at the Trocadéro, opposite the Champs de Mars, where four millions of mètres of land were levelled, but this is small in comparison with seventy millions in the Suez Canal. When the Company first began its works it reckoned on the assistance of manual labour in moving this great mass of earth. The Egyptian labourer is quick; he uses no tools; with his hands he excavates the ground, fills baskets, which he carries on his head to the place where the contents are to be overturned to form the rampart or bank. The work is rapid because the labourers are numerous. In any other country but Egypt the cost would be enormous, but in the ancient land of the Pharaohs, where it has been for ages past the custom to make the population pay a portion of their taxes by labour, the employment of men in great public works is not considered in the light of slave labour.

The company, under agreement with Mahomed-Said-Pacha, thought they should do a humane work and ameliorate the lot of the fellahs, in giving them paid work, when they could be legally employed in gratuitous work. The inhabitants were employed in the beginning in constructing the banks of the canal in the Lake Menzaleh; they were made to excavate the fresh water canal, and were afterwards engaged, to the number of 20,000, upon the table land of El Guisr, where they made a cutting for the maritime canal. It was there that the Company, after a long dispute and a decisive arbitration, were, on receiving a certain amount for compensation, deprived of this element of the work. The work was suspended, and it was necessary to extemporise new means of execution, and to substitute machinery for men. The company had to overcome this difficulty; it had been foretold they would have difficulties of all kinds to surmount, obstacles of nature, political jealousies, jealousies of men, &c. The company obtained the assistance of skilful contractors, who had

had great former experience. The company had taken possession of the Desert; it was already established there. The fresh-water canal carried to the centre of the isthmus supplies of material, and drinking water. The works, properly called of the maritime canal were confined nearly to the earth works begun by the fellahs. Some dredging machines of small power had, it is true, been employed to fill up the marshes around Port Saïd, or to deepen the channel opened in Lake Menzaleh. More powerful dredging machines had been ordered, but these measures taken by the company, in expectation of the combination of machines with the fellahs' work would not be sufficient in the new order of affairs. A cutting of two mètres deep, and of unequal breadth, was opened from Port Saïd to Lake Timsah; it was protected by banks which had begun to harden. On the Suez side no vigorous impulse had yet been given to the work. The bank of the Sérapéum had scarcely been raised. It was specially here that the company had reckoned on the work of the people of the country; and if they still had been able to obtain gangs of workmen, which the government of Egypt had before supplied, no doubt that, towards Suez especially, the raising of earth by wheelbarrows and baskets would have been carried on with great activity. In this state of affairs, it was first necessary to order dredging machines of greater power and in greater number, but the question was how to combine this power. It was not enough to turn, by means of steam power, a string of buckets to excavate the soil and raise the earth; it was necessary to empty the contents of the buckets and carry them to some distance, a slow operation, the cost of which might become so great as to render the operation impossible. The ordinary raising of earth by dredging machines is done in a simple manner. The soil is emptied into boxes which come alongside the dredging machine. When the boxes are full, the boat is sent away, and carries them along the bank. Cranes are stationed there, which seize the boxes, raise them, turn them over, and thus throw the soil to a distance of some mètres into the railway trucks. This plan, however easy under ordinary circumstances, becomes slow and costly when it is necessary to operate on considerable masses of material. Operating on this method, it would be impossible to foresee how long the work would take. The necessity was obvious of constructing new apparatus suitable to a work of exceptional importance, the exigencies of which had not been foreseen, and which involved the employment of means hitherto not used.

The principle of the small dredging machines gave the idea of the following apparatus, a model of which is shown in the Exhibition. To empty the material upon the edge, especially in the cuttings at Port Saïd, a trough of wood or sheet iron was placed under the buckets of the dredging machines; it received the material, and let it run to the ground. The inclination of this trough sufficed for the natural fall of mud or of sand extracted by the dredging machine. But this inclination could only be maintained when the dredging machine stood near the bank where the material was to be deposited. When the apparatus was moved back in order to excavate the canal to its centre, for instance, at 50 mètres from the edge of the water, the trough became useless. It could be lengthened, but then it had no slope. The stuff raised and deposited by the dredging machine soon filled the trough, and it would not reach the ground. Then supposing they were dredging in the middle of the canal, it was not only 50 mètres, or half the total width of the canal, which it was necessary to make the trough, but 10 or 20 mètres more, for it was not sufficient to carry the rubbish to the water's edge; it was necessary to throw it further to provide for further widening, and, above all, to avoid the partial falling in of the embankment into the canal itself. A simple solution of the difficulty was found; though simple, it was some time before it was thought of. They at first tried raising the frame of the dredging machine as high as possible, to the summit of which the buckets were carried and turned over after coming out of the water. To avoid this very heavy framing, which would have upset the centre of gravity, dragging the whole thing over, it was strengthened by means of a framework of iron arranged upon the sides, and supported on a barge. At the height where the buckets empty the stuff brought from below, is placed the trough. In some cases it is 70 mètres long. This trough may be considered as a column of sheet iron cut from the top to the bottom, half of which is so placed as to form a bridge, leading from the dredging machine to the land. This aqueduct bridge is sustained between the dredging machine and the ground by a solid support, resting upon a barge or flat-bottomed boat, but not touching the bank. It is kept at a certain height above the soil, so that the material can fall readily on the ground when it has run from the top to the bottom of the trough. The principal difficulty to surmount was the want of slope in the trough, which was necessarily small on account of its length, and the small elevation of its end next the dredging machine. It was therefore not easy to get the material to run to the end of the trough. Several plans had been tried in shorter troughs; men provided with poles and rakes had pushed the material which stopped on its way, and cleared out the trough; but this plan on the required scale was too insignificant and costly. It was remarked, however, that the buckets in emptying the stuff into the troughs sometimes discharged a certain quantity of water, which was carried up mixed with solid material. This water, descending in fine streams, and introduced between the masses of earth and sand, united with them in the trough, disintegrated them, and finally washed them away; this gave the idea of introducing in the trough a current of water, neither too strong nor too weak; if too strong it would have run over the edge, if too weak the mass of earth would have absorbed it. Pumps were placed near the dredging machines, driven by steam, and water was made to run constantly into the trough, which carried with it the solid products of the dredging machine. This great trough arrangement forms the all important machine for piercing the isthmus. The canal is 160 kilometres from Port Saïd to Suez; more than a third will be dug out by means of this long trough with an ease and economy which it was impossible to have foreseen. The company can triumphantly show this invention to those of its detractors who had speculated on the works of the canal being abandoned when deprived of the native workmen. Whenever the banks of the canal are not too high, the long trough can be used to advantage. A great number of dredging machines ranged along the canal are provided with this instrument. Where the slope of the long trough has been inverse, that is, inclining from the bank to the dredging machine, it has been necessary to build a dredging machine expressly to overcome this difficulty.

The model of an iron elevator is shown; it was not possible to show the apparatus itself, because it is in use in Egypt, and belongs to the contractor and not to the company; besides, a collection of dredging machines, with the long trough, an elevator, a dry excavator, and two boat supports, represent a capital of more than two million francs, without reckoning the expense of carriage and the loss of the use of these machines for a year; and besides, to exhibit them properly at work the Canal Company would have required the use of one whole side of the Champ de Mars, and the expense of erection would have amounted to a million francs. The elevator apparatus consists of two inclined girders of iron, fourteen mètres high; between these supports an endless chain turns, moved by steam, and upon this chain a vessel is attached, which, arriving at the top, is overturned, and discharges the stuff brought up. The stuff is brought up in boxes, hooked to carriages, and descends, when emptied, on the endless chain. There are eighteen of these elevators at work. The earth is carried to the bank by means of long troughs when the soil is lower than

the dredging machines, and by elevators when the soil is higher, so it only remains to provide for the conveyance of material where it cannot be deposited on the bank. For this purpose transport vessels have been built; some are made for sea use. Two decks are placed, one before and the other in the after part of the vessel, for the use of the crew and for working. The centre of the vessel is reserved for the stuff dredged up; it is separated into two cavities by a partition, reaching to the bottom of the vessel, and these are filled with the soil. When these receptacles are full the transport vessel is taken to sea, and by means of a lever the chains which hold the trap doors descend and let fall the material contained in the boat, which returns again under the dredging machine for a fresh load. Other boats of the same kind, with the same appliances, are intended to be used exclusively in the lagoons which the canal passes through. In some vessels the doors are at the bottom, in others at the side; they are made wide and flat, as is necessary for river boats, instead of being narrowed towards the keel like sea boats. There is also a dry excavator shown in full work, and one glance will show its mechanism and utility.

These are the principal models shown by the company; they comprehend the different combinations which have been adopted to excavate the canal and clear away the earth.

These machines, which for the most part present important improvements, are ingenious, economical, and above all practical. The science of dredging was in its infancy when the Suez Canal was commenced; dredging machines had not been employed on any great scale. Necessity is the mother of invention. After the example of what has been accomplished by the genius and perseverance of those employed by the Suez Canal Company, the difficulty of removing the greatest quantity of earth from under the water need no longer be feared. The company were deprived of the assistance of native workmen, and have substituted machines. No sufficiently powerful machines previously existed; it has created them, giving them a power hitherto unknown. The company has done great things; it has peopled a desert, built towns, introduced currency and industry into the isthmus; learning, civilization, and religion have been diffused.

The system of towage, invented by M. Bouquié, and called after him, has been adopted for the provisional transport of goods from one sea to the other by means of the fresh water canal. The system is that known as the immersed chain, upon which the towing vessel hauls itself along, drawing in its train barges laden with thousands of tons of merchandise. The advanced state of the works in the part of the canal leading from Port Saïd to Ismaïla, and the complete construction of the fresh water canal, which, coming to Zagazig, thence descends directly on Suez, have enabled the company to arrange a regular service for the conveyance of merchandise and passengers from one sea to another. Numerous barges, destined to receive the cargoes, have been sent to Port Saïd, and are floating in the canal. A double system of traction has been adopted in the maritime canal, and, provisionally, six steam-boats tow the barges loaded from Port Saïd to Ismaïla, and *vice versâ*.

In the fresh water canal a system of towage has been established. Six tugs perform the service. Two are screw boats, built according to the usual plan, measuring 20 mètres long and 4 mètres wide, of 100 horse-power. The system of towage practised at the Canal Saint Martin, Paris, of which M. Bouquié is the inventor, has been adopted, as being at the same time the most simple and appropriate to the conditions of transit in the isthmus. The tugs employed will be 20 mètres long by 3·50 mètres wide, and are each furnished with an engine of 18 horse-power. The chain by means of which the traction is effected runs over a pulley with teeth, each link of the chain fitting exactly to the tooth of the wheel, which is placed on one of the sides of the tug, an arrangement which allows the chain to be taken hold of and released with the greatest ease. This system has the advantages over the ordinary towage of greater lightness and greater simplicity of machinery, being easier to manage in starting or stopping, or for the passing of two tugs going in opposite directions on the same chain. The conveyance of merchandise and passengers from one sea to another is now managed so as to convey 1,000 tons per day through the isthmus. The Canal Company have thus started its works.

A model of the works established at Ismaïla, by M. Lasseron, is shown. Their object is to convey fresh water to Port Saïd, 80 kilometres distant. M. Lasseron's arrangements work well.

INDUSTRIAL EDUCATION AT CREUSOT.

The following is from the *Pall Mall Gazette* of August 31st:—

The illustrations of the system of education provided for the families of the skilled workmen at Creusot (departement de Saone et Loire) which have been presented to the South Kensington Museum are a valuable and timely gift. We can only regret that the admirable specimens of the actual work executed by these trained men, which fill a large building in the garden of the Paris Exhibition, cannot be added to the handsome gifts of M. Schneider, and exhibited along with them at the Kensington Museum, because by being separated they lose half their value. At Paris you not only see examples of the method of training and the work drawn by the pupils in the schools, but when you have reached the Englishman's conclusion that all this is very fine in theory, but won't do in the practice of life, you turn round to the works which these youths so trained have afterwards executed in the workshops, and you find yourself compelled to own, perhaps reluctantly, that no better work has ever been produced in England.

Creusot may be said to form a kind of model manufacturing community, all placed under the direction of a single individual or firm, and consisting of 24,000 inhabitants. The number of workmen employed is 9,950; the steam power is equal to that of 9,750 horses. There are coal mines which produce 250,000 tons annually. There are iron mines which produce 250,000 tons of minerals per annum; and the annual production of cast iron is 130,000 tons. But it is not in the mere production of raw material that this community expends its skill. It converts its cast iron into all the forms of wrought iron employed in the manufacture of machinery, or in the construction of large engineering works. In the course of a year it turns out 100 locomotives, or about two a week. Although situated far inland, with no direct temptation to undertake naval engineering, it exhibits numerous samples of marine steam engines (one of 950 horse-power) for the iron-clad ships of the Imperial navy.

It is from the examination of these works that we turn to the exhibition on the walls, and there see the moral and intellectual and social organization by which they have been accomplished. From their earliest youth the children of the workmen, male and female, are trained in schools organized by M. Schneider. A large plan and model of the commune of Creusot, pictures of the habitations for workmen, churches, hospitals, and schools, show the admirable provision which is made for the people of Creusot in these respects. Statistical tables illustrate the progress and changes of the population; these are divided into two parts—the one showing the progress of their material welfare, their accumulation of property, and their consumption of food and luxuries; the other showing the amount of attendance at schools, the relative statistics of individual success in these schools, and the subsequent rank attained by each pupil in the manufactories. From these we gather that the progress of education has always been followed by improved moral character and advanced social well-being;

that the pupils who have most successfully availed themselves of the technical schools are those who have afterwards risen to the highest ranks as foremen, clerks, superintendents, overseers, and engineers in the works themselves. And they prove, moreover, a most important doctrine for us, that there is a kind of education which, instead of putting a workman above his work, enables him to do it more to the satisfaction of his employer, and to his own honour, and better for his own personal advancement. The nature of the instruction given in the school is shown in a series of detailed tables now hung on the walls of the Paris Exhibition. These tables comprise the organization of the schools, the programme of subjects taught, distribution of the pupils' time, samples of their mechanical and mathematical drawings, samples of their hand and eye sketches, examples of writing and French composition, lists of their studies in religion, sacred history, French history, and geography; studies in arithmetic, algebra, elementary geometry, and descriptive geometry; specimens of ornamental writing and map drawing. These are for boys. But the girls are also well educated, with the difference that for plan drawing and geometry are substituted needlework and dressmaking. They are also taught book-keeping.

There is one point on which M. Schneider speaks almost with the air of an injured man: after his pupils have been trained in his schools and put through their apprenticeship in his works, they are coveted on all sides by other manufacturers, and stolen from him in large numbers. We are not sure that M. Schneider does not make this complaint with a quiet internal chuckle of self-complacency, that he not only manufactures good skilled artizans, but also finds them good masters. Seriously, we do not think M. Schneider is very sorry. We do not think that his giving us, his rivals, all this information looks very narrow-minded; and the candid way in which he lays before us on the walls of the Exhibition the cost price of his goods, the revenue he gets in return, and the mode in which that is expended in wages, materials, and the well-being of the community, suggests that he seeks his chief reward in the prosperity of his people and in the example which he offers for imitation to the world.

In conclusion we would venture to suggest to M. Schneider a very simple way in which he may add to the benefit which his gift to the Kensington Museum confers on the British community. A great deal of the most valuable information he gives consists in printed tables and engravings. Would he be kind enough to give a copy of each of these to the chambers of commerce or town councils of such manufacturing towns as Manchester, Birmingham, Leeds, Sheffield, Newcastle, and Glasgow? In this way he would enable the different classes of these communities to see, and judge between the two great principles of social organization—the one principle of every man for himself, and the other of every man for the general good. They would be enabled to see in the example of Creusot how combinations may be formed, not of one class against every other class, but of each for the benefit of all.

Fine Arts.

PRESENTATION OF WORKS OF ART TO PUBLIC ESTABLISHMENTS BY THE FRENCH GOVERNMENT.—The usual report of presentations of works of art by the Ministry of the Fine Arts on the occasion of the Imperial Fêtes, has just appeared, and is of unusual length; the recipients include churches and chapels in sixty-four departments of France, and in Algeria; the four great public libraries of Paris; the Senate, and the Corps Legislatif; the Council of State; the Institut; the Sorbonne; the Archives of the Empire; the Museum of Natural History; the Louvre; the Conservatoire des Arts et Metiers; seven Imperial and special schools; the Union Centrale of Applied Art; the Imprimerie Impériale, and the Geographical Society; and more than two hundred museums, libraries, and scientific and artistic institutions in the provinces. The Minister of the Beaux Arts is a splendid customer to the artists of France.

Commerce.

MINERAL STATISTICS.—Mr. Robert Hunt, F.R.S., Keeper of Mining Records, has issued his "Mineral Statistics of the United Kingdom" for the year 1866. Sir Roderick Murchison, in the preface, draws attention to the remarkable increase in the production of coal during the past year, notwithstanding the depression in many manufactures, and especially in that of iron. It appears that the collieries of the United Kingdom produced, during the year, the enormous quantity of 101,000,000 tons of coal. The estimated value of that coal is £25,407,635. The quantity of iron raised in 1866 was 9,665,012 tons, which produced in metals, 4,523,897 tons; the estimated value of the raw material being £3,119,098, and of the manufactured £11,309,742. The following is a summary of the returns of coal produced in the various colliery districts of Great Britain and Ireland during the year 1866:—Durham and Northumberland, 25,194,550 tons; Cumberland, 1,490,481; Yorkshire, 9,714,700; Derbyshire, 4,750,520; Nottinghamshire, 1,600,560; Leicestershire, 866,560; Warwickshire, 775,000; Staffordshire and Worcestershire, 12,298,580; Lancashire, 12,320,500; Cheshire, 895,500; Shropshire, 1,220,700; Gloucestershire and Somersetshire, 1,850,700; Monmouthshire, 4,445,000; South Wales, 9,376,443; North Wales, 2,082,000; Scotland, 12,625,000; Ireland, 123,750. Total produce of the United Kingdom, 101,630,544 tons. This gives an increase of 3,479,957 tons in 1866 over the production of the previous year. In 1856 there were 2,815 collieries in England and Wales, and in 1866 there were 3,188. The quantity of iron ore produced in this country last year was 9,665,012 tons; about 300,000 tons less than the quantity returned in 1865. In the same period the quantity of pig iron made was 4,530,051 tons, or 289,203 tons less than the production of our blast furnaces in the previous year. The estimated value of iron ore raised in the United Kingdom amounted to £3,119,098 19s. 6d. Foreign ore imported, 56,689 tons; custom-house value, £49,081; making a total quantity of 9,721,701 tons converted into iron. The number of furnaces in blast were 618. Pig iron produced: In England, 2,576,928 tons; in Wales 959,123 tons; in Scotland, 994,000 tons. Total production of pig iron in Great Britain, 4,530,051 tons. This quantity, estimated at the mean average cost at the place of production, would have a value of £11,309,742.

Colonies.

AUSTRALIAN VINE-GROWING.—The following are the yields of some of the principal vineyards in the western districts of Victoria, in 1867, compared with the yield of the same vineyards in 1866:—

		1866.	1867.
Guarwarre ..	11 acres ..	5 hhds. ..	22 hhds.
,,	16 ,, ..	1,500 galls. ..	1,500 galls.
,,	6 ,, ..	,, ,, ..	1,000 ,,
Ceres	8 ,, ..	1,200 ,, ..	2,000 ,,
Duneed	16 ,, ..	3,000* ,, ..	—
Frogmore ..	4 ,, ..	21 hhds. ..	—
Moorabool ..	20 ,, ..	2,500 galls. ..	7,000 ,,

On a whole showing a decrease in the yield, which was caused by dry winds and weather in the early part of the season, and by wet weather lately causing the grapes to burst.

* And sold 25 tons of grapes.

Notes.

Sewerage of Paris.—A very important work has been some time under hand in the western portion of the city, namely, a second great *égout collecteur*, the object of which is to prevent the contamination of the whole horse-shoe bend of the Seine which encloses the Bois de Boulogne. The new main drain commences at the Place de l'Alma, nearly opposite the Exhibition, and will terminate at Neuilly, a distance of between three and four miles. The work is being performed by tunnelling, and by means of shafts 60 to 80 feet deep, and 150 feet apart. This sewer will carry the drainage of the left bank of the Seine, after it has crossed the river by means of a syphon, to a spot just below the island of Neuilly, and thus probably keep out impurities from the Seine for a distance of nine or ten miles, the bend of the river being very sharp in this part; it will also serve to convey away the water of a very dirty little stream, called the Bièvre.

Correspondence.

Artizans' Visits to Paris.—Sir,—Permit me, through the columns of the *Journal*, to express my views as to the admirable arrangements made by the British Commission to aid the inquiries and add to the comfort of artizans visiting the Paris International Exhibition, now open. At the request of the Birmingham Chamber of Commerce, I accompanied 25 representatives of the industries of Birmingham sent by the Society of Arts, and my experience is that no means was spared by those in attendance at the British Workmen's Hall to render the object and intentions of the visit practically useful. The indefatigable exertions of Mons. Haussoullier secured for the Birmingham representatives admission to the leading establishments engaged in the production of works in the precious metals, bronzes, gas-fittings, plumbers' work, brass founding, railway carriages, the mint, die-sinking, gun-making, tin and copper working, japanning, and galvano-plastic works. Moreover, through the introductions given by him, the artizan visitors were also provided with intelligent guides and interpreters, who became the medium of communication through which questions were asked and answers received. The Workmen's Hall serves also the purpose of a reading room, the tables being covered with English and other papers, periodicals, literary and scientific, and reports on the trades of Paris. On the walls are hung carefully-prepared lists of places, with the days and conditions under which they may be visited; pens and ink afford the means of letter-writing. Altogether the arrangements of the British Workmen's Hall are of the most satisfactory and efficient kind; it is a place of meeting—a quiet retreat for a few minutes from the bustle and heat of the interior of the Exhibition building. Having for ten days been a daily witness to the useful and efficient working of the arrangements in the British Workmen's Hall, and the untiring courtesies and labours of Mons. Haussoullier, in whose care the British Commission have placed the hall, I have much pleasure in bearing my testimony on the subject. Trusting you will give this a corner in your *Journal*, I am, &c., W. C. Aitken.

Birmingham, September 11, 1867.

Patents.

From Commissioners of Patents' Journal, September 6th.

Grants of Provisional Protection.

Agricultural implements, &c.—2426—J. Phillips-Smith.
Boilers, measuring water to—2422—J. Varley.
Boilers, supplying water to—2430—H. and D. Davey.
Bottle stoppers—2418—D. Taylor.
Carriages—2262—J. G. Tongue.
Cartridge cases—2318—W. T. Eley.
Chocolate and cocoa—2102—C. Klug.
Coining presses—2398—J. M. Napier.
Gas, &c.—2414—J. L. Norton and G. Hawksley.
Hurdles, lifts, and fencing—2396—J. Sainty.
Liquids, raising by steam power—2408—A. M. Clark.
Looms—2416—D. Whittaker.
Lubricators—2404—S. Lynes.
Metal joints—2406—W. Newsome.
Omnibuses, registering number of passengers carried in—2392—W. Thomas.
Printing types, setting up and distributing—2432—P. Kniaghininsky, P. Galahoff, and N. Ossipoff.
Processes, solvent or detergent—2410—J. G. Marshall.
Reaping and mowing machines—2260—A. C. Bamlett.
Sewing machines—2428—M. Samuelson.
Ships, constructing—2412—T. W. Lawson.
Spools, reels, &c —2390—W. Bostock.
Towels—2424—J. and J. Cash.
Tubes, waterproof—2394—G. Luyckx.
Umbrellas and parasols—2400—T. Widdowson.
Valves—2402—T. Sault.

Inventions with Complete Specifications Filed.

Water, aëration of fresh—2452—J. H. Johnson.
Metallic surfaces, bronzing—2453—J. Storey, W. E. Bickerdike, and W. V. Wilson.
Carpet stretcher and tack driver—2475—A. H. Brandon.
Fire-arms, breech-loading—2488—W. R. Pape.

Patents Sealed.

654. F. Pope.
676. J. S. Gisborne.
678. G. Glover.
687. A. Kimball.
693. W. Dempsey.
696. M. P. W. Boulton.
703. B. P. Walker.
707. J. F. Brinjes.
715. J. Willcock and S. Mason.
720. T. and T. F. Walker.
723. F. R. A. Glover.
738. P. T. Goodwin.
760. W. R. Harris.
790. J. Hislop.
792. A. V. Newton.
806. S. M. Tyler.
826. W. D. Player.
829. C. Kaufmann.
889. J. M. Jomain.
1068. A. V. Newton.
1524. A. M. Clark.
1642. M. Cavanagh.
1973. W. R. Lake.
2089. H. A. Bonneville.

From Commissioners of Patents' Journal, September 10th.

Patents Sealed.

702. T. Burt.
708. J. Fox.
718. J. Thévenet.
719. J. Boyd.
721. J. Hamilton.
725. G. Rumbelow and H. Kendall.
726. W. Wootton.
727. J. Griffith.
728. B. Platt.
729. J. C. Morrell.
730. W. Esplen & J. J. B. Bland.
732. E. Lee.
747. E. P. Plenty.
753. N. Thompson.
762. J. Grundy.
766. J. Hickisson.
772. J. Shand.
778. H. Simms.
804. T. K. Mace.
841. J. Spencer.
892. G. R. Postlethwaite.
899. A. Turner & W. E. Newton.
907. W. Crighton.
930. A. Barff and J. Kidd.
1880. W. R. Lake.

Patents on which the Stamp Duty of £50 has been Paid.

2161. R. A. Brooman.
2163. J. Ivers and T. Ogden.
2196. A. V. Newton.
2178. T. H. Baker and T. Woodroffe.
2168. T. E. Symonds.
2177. D. Walker.
2181. W. H. Perkin.
2195. G. Bedson.
2193. J. Fleming.
2351. W. Whittle.
2203. H. D. P. Cunningham.
2212. L. F. Goodbody.
2237. Z. S. Durfee.
2253. A. M. Perkins.

Patents on which the Stamp Duty of £100 has been Paid.

2144. G. Bedson.
2166. J. Hamilton.
2184. T., E., and J. Thornton.

Registered Designs.

4875—August 9th—Fastening for the handles of brooms and other articles—W. Gibson, Birmingham.
4876—August 10th—Screw wrench—J. Asbury, Balsall-heath, Birmingham.
4877—August 14th—A stay bust fastening—Helby and Sons, Portsea.
4878—August 20th—An improved loom picker—J. Sharpe, Park-road, Bradford, Yorks.
4879—August 26th—A ratchet die for cutting screws on pipes—J. W. Taylor, T. Andrew, and S. H. Stephens, Commercial-street, E.C.

Journal of the Society of Arts.

FRIDAY, SEPTEMBER 20, 1867.

Announcements by the Council.

ARTIZANS' VISITS TO PARIS.

Her Majesty's Government have transmitted to the Society of Arts, in aid of the fund raised by the Society for assisting workmen, specially selected from various trades, to visit and report on the Paris Exhibition, the sum of £500, which was granted conditionally on the Society raising a like amount by public subscription.

The amount received up to the present time is as follows :—

H.R.H. THE PRINCE OF WALES, President	£31 10 0	
Society of Arts	105 0 0	£518 14 0
Other Subscriptions	382 4 0	
HER MAJESTY'S GOVERNMENT.. ..	500 0 0	
Total	£1,018 14 0	

Subscriptions may be forwarded to the Financial Officer, at the Society's House.

The following workmen have already been selected, and many of them are now in Paris :—

NAME.	TRADE.
Connolly, Thomas	Mason.
Lucraft, B.	Chairs and sofas.
Whiteing, Geo	Grainer and decorator.
Kay, Alexr.	Joiner.
McEwen, J.	Mason.
Forbes, G. B.	,,
Whiteing, Richd.	(Special reporter.)
Green, Aaron	Decorator.
Beardmore, Wm.	Potter.
Hooper, C. A.	Cabinet maker.
Blunt, Walter	Leather worker.
Walker, Wm.	Woodworking machinery.
Wilkie, Thos.	,, ,,
Booth, Laurence	Ribbon weaving.
Gutteridge, Joseph....	,,
Gregory, John.....	Watch trade.
Stringer, James	,,
Stanton, George	Horticulturist.
Bird, Joseph	Lace trade.
Dexter, George	,,
Smith, Edward	,,
Kendall, George	Hosiery trade.
Caunt, Geo.	,,
Wilson, John	Cutlery.
Bramhall, Wm.	Saw maker.
Cooper, Samuel	Floor and wall tiles and pavements.
Coningsby, R.	(Special reporter.)
Evans, J.	Engineer.
Rosmüssen, P. A.	Silversmith.
Sinclair, R.	Tailor.
Bourne, W.	Foreman, india-rubber works.
Letheren, W.	Art metal workman.
Winstanley, T. W.....	Architectural metal worker
Prior, J. D.	Carpenter.
Mondy, E. F.	Shipwright.
Jeffery, J.	Bricklayer.
Hughes, J. W.	Joiner.
Elliott, W.	Die-sinker.
Howell, G.	Bricklayer.
Bentley, J.	Ivory carver.
Berry, G.	Engraver.
Barrett, R.	Silver chaser.
Kirchoff, F.	Glass painter.
Jacob, T.	Cabinet draughtsman.
Page, G.	Silversmith.
Mackie, J.	Wood carver.
Baker, R.	,,
Genth, L.	Bookbinder.
Randall, J.	China painter.
Oats, Francis	Mining.
Jung, H.	Watchmaker.
Bartlett, Charles.....	Plasterer.
Learmouth, W.	Engineer.
Boast, James	Shawl weaver.
Appleton, John	,,
SENT FROM BIRMINGHAM.	
Taylor, J.	Gas-fitting, chandeliers, and lamps.
Bayley, Thomas	Plumbers' brass foundry.
Gorman, William	Cabinet ,, &c.
Dry, Henry	General ,,
Fowler, Henry	Labour-saving machines.
Clay, John	Saddles and bridles.
Thompson, Frederick..	Harness and leather work.
Plampin, James	Jewellery and gilt toys.
Johnson, Thomas	Buttons.
Bridges, Wm.	Buttons, metal caps, tools, and metal ornaments.
Hibbs, Charles.....	Guns, &c.
Sargeant, David	Papier-maché, &c.
Archer, Thomas	Japanning.
Guise, Wm.	Needles and fish-hooks.
Pearsall, Richd.	Glass for glazing purposes, plate-glass, &c.
Swene, W. S.	,, (fancy.)
Wilkinson, T. J.	,, (practical manipulation.)
Moore, Chas. W.	Die-sinking.
Poole, Edwin	Tinplate working.
Whitehouse, Benj.	Railway-carriage building.
Jackson, F.	General ornament.
Deeley, W. J.	Jewellery, with diamonds and precious stones.
Fellows, Henry	Electro-plate and plated wares.
Petit, J. L.	Steel pens.
Ansell, James	Church and other bells.
Fisher, John	Gas and other tubes.
Dodd, J.	Chandeliers and gas-fittings.

Proceedings of the Society.

MEMORIAL TABLETS OF GREAT MEN AND EVENTS.

Tablets to the memory of illustrious men have now been placed in the following situations in London :—

Lord Byron.—24, Holles-street, Cavendish-square.
Napoleon III.—3A, King-street, St. James's.

Whilst the Council intend proceeding with this work, they desire also to see it carried on by others—either by corporate bodies or individuals—and the Council will be happy to be instrumental in procuring suitable tablets from the manufacturers. It is hardly necessary to repeat how greatly the interest of the metropolis would be increased thereby.

In order to show how rich the metropolis is

in the memory of important personages and events, which it would be desirable to mark by means of tablets on houses, the Council have caused an alphabetical list to be prepared, the first part of which is now inserted. Other parts will follow. The Council request the assistance of members of the Society in completing and correcting this list, especially with reference to dates and the insertion of other names.

*A'Becket, Thomas (b. 1117—d. 1170).—Was born in a house which stood on the site of Mercer's Chapel.

Abernethy, John, the great surgeon. Lived at No. 14, Bedford-row, Bloomsbury.

Abingdon, Mary, sister of Lord Mounteagle. She wrote the famous letter which led to the discovery of the Gunpowder Plot. Abingdon-street, Westminster, near old Palace-yard, takes its name from her.

Abington, Frances, celebrated actress (b. 1785—d. 1815); lived at 19, Eaton-square, Grosvenor-place, in 1807; a portrait of her hangs at the Garrick Club.

Adam, Robert, architect; built the Adelphi, over the ground on which old Durham-house stood; also the screen in front of the Admiralty; Mansfield-street; Portland-place, Regent's-park, &c.

Addison, Joseph, the poet (b. 1672—d. 1719); educated at Charter-house; frequented Button's coffee-house, which stood on the south side of Russell-street; also St. James's coffee-house, St. James's-street (no longer standing). His "Campaign" he wrote in an attic, at the top of a small shop in the Haymarket. In 1710 he lived in St. James's-place, St. James's-street, and after his marriage with Lady Warwick, at Holland-house, in Kensington. Here his death-bed interview took place with the young and profligate Earl of Warwick, by which he hoped to show him how a Christian can die. His "Cato" was performed at Leicester-house, Leicester-square, by the junior members of the Royal family, and Prince George, afterwards George III. played the part of Portius. He was buried, and a monument was erected to his memory, in Westminster Abbey.

Ainsworth, Robert, (b. 1660—d. 1743) kept an academy at Bethnal-green; author of the Latin Dictionary.

Akenside, Mark, author of the "Pleasures of Imagination." At Tom's coffee-house, Devereux-court, Strand, he, Dr. Birch, and others, spent their winter evenings. He resided in Bloomsbury-square, also in Old Burlington-street, where he died, June 23rd, 1770, and was buried in St. James's churchyard.

Alexander, Sir W., Earl of Stirling, the poet; lived in St. Martin's-lane from 1631 to 1632, and in Drury-lane 1634—1637, and in the north-west angle of the Piazza, Covent-garden.

Alleyne, Edward (b. 1566—d. 1626), celebrated actor and philanthropist; baptised at St. Botolph, Bishopsgate Without; lived "harde by the chapel chynke by the banksyde neere Wynchester-house." He built and endowed almshouses in Lamb-alley, Bishopsgate-street, in Bath-street, Old-street, St. Luke's, and in Soap-yard, Deadman's-place, Southwark, about 1620. He also founded Dulwich College in 1619. He acted at the Fortune Theatre, Peter-street, and also at the Paris Garden Theatre in Southwark; he was also one of the last masters of the Bear-garden to Queen Elizabeth and James I.; also lord of the manor of Kennington. His portrait hangs at Dulwich College.

Anderson, Adam (d. 1765), author of the "History of Commerce;" was forty years a clerk in the South Sea House.

Anderson, Dr. Patrick, physician to Charles I.; his pills are very celebrated, and are now sold at No. 165, Strand, Inglis's Warehouse; in 1699 they were sold at the "Golden Unicorn," over against the "Maypole," in the Strand. Tom Brown says, "There are at least half-a-score of pretenders to Anderson's Scotch pills, and the Lord knows who has the true preparation."

Anglesea, Marquis of. Uxbridge-house, Burlington-gardens, is the Town-house of this nobleman, it was built by Vardy (1792) on the site of Queensbury-house.

Anglesea, Earl of (Arthur Annesley, (b. 1614—d. 1686), Lord Privy Seal from 1669 to his death; he lived two doors from John Lacy, the comedian, in Drury-lane.

Apsley, Sir Allan, (d. 1630) falconer to Charles II. and lieutenant of the Tower; maternal grandfather to the first Earl of Bathurst; lived for many years in a house in St. James's-square; in this house the Duke of York, afterwards James II., slept the first night of his hurried and unexpected return from Brussels. A monument stands to Sir Allan in the chancel of St. Peter's ad Vincula in the Tower of London.

Argyll, Marquis of, (d. 1661), the first celebrated Marquis of the Scotch Covenant; was married, in 1609, to Ann Cornwallis, daughter of Sir William Cornwallis, in St. Botolph's Church, Bishopsgate-street-without; he lived from 1634 to 1637 in Drury-lane, and was beheaded in 1661.

Argyle and Greenwich, Duke of, (d. 1734), lived in Bruton-street:—

> "Yes on the great Argyle I often wait
> At charming Ludbrook or in Bruton-street."

—(Sir Charles Hanbury Williams' Poems, 1768, p. 56.)

Argyle, Dukes of, lived in Argyle-street, Regent-street; this was originally their town-house, but was purchased some years ago by the Earl of Aberdeen. It has lately been pulled down.

Arlington, Henry B. Earl of, (b. 1618—d. 1685), one of the members of the celebrated Cabal; his town-house was Arlington-house, St. James's-park.

Armstrong, Dr. J., (b. 1709—d. 1779), poet, author of the "Art of Preserving Health;" lived and died at Russell-street, Covent-garden; he is buried in St. Paul's, Covent-garden, in a vault under the communion-table. A portrait of him, by Sir Joshua Reynolds, hangs in a room at the banking-house of Messrs. Coutts, No. 59, Strand.

Arundel, Earl of, Thomas Howard, (d. 1646), the "magnificent" Earl and a great collector of art and antiquities; lived in 1619-20, in Castle-yard, Holborn; his Countess, Alathea, had Tart-hall built for her, outside St. James's-park, near Buckingham-palace.

Arundel, Earl of, Henry Fitzallan (d. 1579); he purchased Arundel-house, in the Strand, with other messuages, for £41 6s. 8d.; he lived and died here. This was the town-house of the earls for some time.

Ashburnam, Jack, (b. 1603—d. 1671), was inseparably connected with the misfortunes of Charles I.; lived at Ashburnham-house, Little Dean's-yard, Westminster.

Ashmole, Elias, (b. 1617—d. 1692), founder of the Ashmolean Museum, Oxford; married the daughter of Sir William Dugdale, 3rd Nov., 1668, at Lincoln's Inn Chapel, Lincoln's Inn; he lived at Middle Temple-lane, and also in Ship-yard, Temple-bar. A marble slab is erected to his memory at St. Mary's Church, Lambeth.

Astley, John, (d. 1787), the artist; lived at Schonberg-House, Pall Mall.

Astley, Philip, (b. 1742—d. 1814), the originator of Astley's Amphitheatre; he had been a light horseman in the 15th or General Eliott's regiment, and was said to be the handsomest man in England; his first equestrian performance was at the "Halfpenny Hatch," a lane between Lambeth and the Waterloo-road; he afterwards built the Olympic Theatre, in 1804, on the garden ground of Old Craven-house.

Atterbury, Francis, Bishop of Rochester, (b. 1662—d. 1772), educated at Westminster school; when a young

* The facts in these notices have been chiefly extracted from Peter Cunningham's "Handbook of London," by permission of Mr. Murray, the publisher. Other works consulted have been Pennant's "History of London," Hone's "Every-day Book," Timbs's "Walks and Talks about London," &c., &c.

man, he was minister and preacher of Bridewell; lived in Church-lane, Chelsea, was Dean of Westminster and preacher of the Rolls; confined in the Tower, 1722, and died in banishment, but his remains rest in Westminster Abbey.

Aubrey, John, (b. 1625—d. 1697), the celebrated antiquary; lived at Mr. H. Coley's house in Rose and Crown-court, Gray's Inn-lane, 1672.

Aylesbury, Earls of; their town house was Aylesbury-house, Clerkenwell, the site of the present Aylesbury-street.

Ayton, Sir Robert, (b. 1570—1638), the poet; was appointed master of St. Katherine's, at the Tower, by Queen Henrietta Maria; he is buried in Westminster Abbey.

Babington, Antony (d. 1586), the conspirator, concealed himself in St. John's-wood. He was executed at St. Giles's-in-the-fields, Lincoln's-inn-fields, in 1586.

Bacon, Antony, brother to Francis Bacon; lived in Bishopsgate-street, near the Bull Inn.

Bacon, Lord F. (b. 1561—d. 1626), Lord High Chancellor, author, &c.; born at York-house, in the Strand; baptised in St. Martin's-in-the-fields; dates the dedication of his essays, "from my chamber at Gray's Inn," January 30, 1597.

Bacon, John (b. 1740—d. 1799), sculptor; lived at 17, Newman-street, from 1777 to his death, 1799; buried in Whitfield's Chapel, Tottenham-court-road; monument to him there.

Bacon, Sir Nicholas, Lord Keeper of the Great Seal, (b. 1510—d. 1579), lived at Bacon-house, in a street off Cheapside; founder of Cursitor's office or inn, Chancery-lane; died at York-house. Monument preserved in the crypt of St. Paul's Cathedral.

Bagford, John (b. 1651—d. 1716), co-projector of the society of antiquaries, 1707; was born in Fetter-lane; lived at Turnstile, first as a shoemaker and then as a bookseller. Died in the Charter-house.

Baillie, Matthew, M.D. (b. 1761—d. 1823); lived at 72, Lower Grosvenor-street; also at 35, Cavendish-square, where he died; bust of him at the College of Physicians.

Baily, Francis, (b. 1774—d. 1844), President of the Royal Astronomical Society; lived at 97, Tavistock-place, Tavistock-square, from 1825 to 1844. Portrait of him in the Council-room of the Royal Astronomical Society, Somerset-house.

Baker, (b. 1568—d. 1644-5), author of the "Chronicles of the Kings of England;" lived from 1632 to 1639 in Milford-lane, Strand; imprisoned in the Fleet Prison. Died there. Buried at St. Bride's or St. Bridget's, Fleet-street.

Balmerino, Arthur Elphinstone, Lord (b. 1686—d. 1746); lived at Rathbone-place; imprisoned in the Tower of London; tried at Westminster Hall; beheaded on Tower-hill, August 18th, 1746. Buried at St. Peter's ad vincula, in the Tower.

Banks, Thomas, R.A. (b. 1735—d. 1805), sculptor; born in Lambeth. Lived at No. 5, Newman-street, from 1781 to his death, 1805. Buried at Paddington Church.

Bannister, John (b. 1760—d. 1836), actor, lived at 65, Gower-street, Bedford-square; made his first appearance at the Haymarket Theatre.

Barebones, "Praise God Barebones," lived in Fleet-street. He was a leatherseller, and owner of a house called "The Lock and Key," in the parish of St. Dunstan in the West.

Barham, Rev. Richard Harris (Thomas Ingoldsby), died rector of the united parishes of St. Augustine's, Watling-street, and St. Faith under St. Paul's.

Barker, Robert (d. 1806); built the Panorama in Leicester-square, and invented the species of exhibition which gives its name to the building. The building was pulled down some years ago.

Barker, Thos., painter; lived at 20, Brook-street, Grosvenor-square.

Barnard, Lady Anne, (d. 1825); lived and died in 21, Berkeley-square; authoress of "Auld Robin Gray."

Barnes, Thos. (b. 1785—d. 1841), editor of *The Times;* educated at Christ's Hospital; buried at Kensal-green.

Barrow, Isaac, (b. 1630—d. 1677), divine; lived at Charing-cross; also, in 1761, in Pall Mall, the west-end of the south side; educated at Charter-house; lecturer at Gresham College; buried in Westminster Abbey. There is a bust of him there.

Barry, James Richard (b. 1741—d. 1806), painter; painted the series of allegorical pictures for the Great Room of the Society of Arts; lived at 36, Castle-street, Oxford-market; lived also at 29, Suffolk-street, Haymarket, between the years 1773 and 1776; died at 76, Great Titchfield-street, Marylebone, the house of Mr. Bonomi; buried in St. Paul's Cathedral.

Barry, Spranger, actor; lived in the corner house on the west side of Bond-street, formerly Will's coffee-house.

Bathoe, bookseller; established, in 1740, the first circulating library in London; his shop was at 132, Strand.

Bathurst, Henry, Baron Apsley, (b. 1708—d. 1794), built Apsley-house; lived in St. James's-square.

Baxter, Richard, (b. 1615—d. 1691), the nonconformist divine; lived in Bloomsbury-square; preached in a room over St. James's Market-house, Jermyn-street; built a chapel in Oxenden-street, Coventry-street, Haymarket, and in order to drive him from it, Secretary Coventry ordered the king's drums to be beaten under the window to drown his voice; he was confined in the King's Bench, and buried in Christchurch, Newgate-street.

Beattie, James, Dr., (b. 1735—d. 1803), author of "The Minstrel;" lodged at 64, Wells-street, Oxford-street in the year 1771.

Beaumont, Francis, (b. 1586—d. 1615), dramatist; lived at the Inner Temple; buried in Westminster Abbey.

Beaumont, Sir George Howland, (b. 1753—d. 1827); lived at 29, Grosvenor-square; gave, in 1826, sixteen pictures to the National Gallery, valued at 7,500 guineas.

Beckford, William, (b. 1760—d. 1844), author of "Vathek;" lived in a house (now Cockerell's), in Piccadilly; also at No. 4, Devonshire-place, in 1810.

Bedford, Francis, Earl of (d. 1641); formed Covent-garden-square (circ. 1631); also St. Paul's, Covent-garden.

Beloe, W. (b. 1757—d. 1817) translator of Herodotus, and divine, lived in Brompton; rector of All Hallows-in-the-Wall.

Bentham, Jeremy (b. 1747 8—d. 1832), author and lawyer; designed the Millbank Prison; lived and died in Queen-square, Westminster.

Bentley, Richard (b. 1662—d. 1742), critic and divine; lived at Ashburnham-house, Little Dean's-yard and Cloisters, Westminster Abbey, now a prebendal house; also in Park-street, Westminster.

Berkeley, George, Bishop of Cloyne (b. 1684—d. 1743), author and divine; lived in Albemarle-street in 1724, also in Piccadilly.

Berkeley, Stratton John, Lord (d. 1678), hero of Stratton fight, during the civil war in Charles I. time; lived in Berkeley-house, Piccadilly, now Devonshire-house.

Bertie, Robert, first Earl of Lindsey (d. 1642), general of the King's forces at the outbreak of the civil war under Charles I. He lived at Lindsey-house, No. 59 on the western side of Lincoln's-inn-fields, and also at Lindsey-house, Chelsea, which he rebuilt.

Betterton, Thomas (b. 1635—d. 1710), actor, lived in Salisbury-court, Fleet-street, and also at Russell-street, Covent-garden, where he died. He was buried in Westminster Abbey.

Bill, John (temp. Charles II.), King's printer, lived in Printing House-square, Blackfriars. He was the printer of the proclamations of the reign of Charles II., and of the first *London Gazette.*

Birch, Dr. Thomas (b. 1705—d. 1766), historical and biographical writer, frequented Tom's coffee-house. He lived in the last house on the south-west side of Norfolk-

street, Strand, called Penn's house. Buried at St. Margaret's Pattens.

Birkbeck, Geo., M.D. (b. 1776—d. 1841); founded the London Mechanics' Institute; buried at Kensal-green.

Blackmore, Sir Richard (b.1650—d. 1729), poet, followed the profession of a physician at 142, Cheapside, next door to Sadler's-hall.

Blackstone, Sir William (b. 1723—d. 1780), the great lawyer; lived in No. 2, Brick-court, Middle Temple, on the first floor; educated at Charter-house; was a Templar.

Blake, William (b. 1757—d. 1828), artist and engraver; lived at No. 3 in Fountain-court, Strand; also at 17, South Molton-street, New Bond-street; buried in Bunhill-fields burial ground.

Bloomfield, Robert (b. 1766—d. 1823), poet, originally a shoemaker; lived at 149, Great Bell-yard, in Coleman-street.

Bolingbroke, Henry, Viscount St. John (b. 1678—d. 1751); lived at Battersea; and also, when Secretary of War, in Golden-square, Regent's-quadrant

Bond, Sir Thomas; began to build Albemarle-street, Piccadilly (circ. 1684); was comptroller of the household to Queen Henrietta Maria. Old Bond-street is named after him.

Bone, Henry, R.A., the enameller (b. 1755—d. 1834); lived at No. 15, Berner's-street, Oxford-street.

Bonner, Edmund, Bishop of London (d. 1569); lived at Bishop's Hall, Bethnal-green, now pulled down; Bonner's-fields, close by, named after him; was afterwards imprisoned in the Marshalsea, Southwark, where he died, and was buried at night, with other prisoners, at St. George the Martyr's.

Booth, Barton, actor (b. 1681—d. 1733); lived and died at his house in Charles-street, Covent-garden. He was the original *Cato* in Addison's play. Barton-street, Westminster, is named after him.

Boscawen, Admiral (b. 1711—d. 1761); lived and died in No. 2, St. James'-square. The iron posts in front of this house are some guns he took from the French off Cape Finisterre.

Boswell, James, biographer of Dr. Johnson; lived at the chambers of the Rev. Mr. Temple, Farrar's-buildings, at the bottom of Inner Temple-lane. On the 16th of October, 1769, he gave a dinner to Dr. Johnson, Reynolds, Goldsmith, and Garrick, at his lodgings in Old Bond-street. He and Dr. Johnson occasionally supped at the Crown and Anchor Tavern, in the Strand (now the Whittington Club); also at the Mitre Tavern, Mitre-court, Fleet-street. He died at No. 47, Great Portland-street.

Bouchier, Elizabeth; married, 20th August, 1620, to Oliver Cromwell, aged 21, at St. Giles, Cripplegate.

Bourgeois, Sir Francis, R.A. (b. 1756—d. 1811); founder of the Dulwich Gallery.

Boydell, John (b. 1719—d. 1804); lived and had his shop at No. 90, Cheapside, corner of Ironmonger-lane. He built the British Institution, Pall-mall, to contain the pictures composing his celebrated Shakespeare Gallery. Was buried at St. Olave's, Jewry. His portrait hangs at the Stationers' Hall.

Boyle, Hon. Robt. (b. 1626—d. 1691); lived in Pall-mall, next to Sir W. Temple; one of the early members of the Royal Society.

Boyce, Sam., the poet (b. 1708—d. 1749); lived at a sponging house in Grocer's-alley.

Britton, Thos., the musical small-coal man (d. 1714). He was the first to establish any assembly deserving the name of a concert in London; and he held the celebrated music meetings, from 1678 till his death, in 1714, over his repository for small coal, at the corner of Aylesbury-street, Clerkenwell. The room was long and narrow, and a tall man could not stand upright, but it was attended weekly by all ranks from the highest to the lowest.

Brook, Lord; lived in Hanover-square, about 1720. One of the first inhabitants.

Brooke, Fulke Greville, Lord (b. 1554—d. 1628); lived in Austin Friars. His residence, Brooke-house, stood on the site of Greville-street, which is named after him. In this house he was assassinated by his servant, Sept. 1st, 1628.

Bunyan, John (b. 1628—d. 1688), author of "Pilgrim's Progress;" died at the house of his friend, Mr. Sturdwick, a grocer, at the sign of the Star, on Snow-hill; buried in Mr. Sturdwick's vault, in Bunhill-fields burial-ground.

Burbridge, Richard (b. 1618-20), actor; joint-tenant with Shakespeare of the Blackfriars Theatre; lived and died in Holywell-street, Shoreditch.

Burdett, Sir Francis (b. 1770—d. 1844), lived at 25, St. James's-place; imprisoned in the Tower.

Burke, Edmund (b. 1730—d. 1797), orator and historian; a Templar; lived in Charles-street, St. James's-square, also in Gerard-street, Soho (house unknown).

Burlington, Richard Boyle, 3rd Earl of (b. 1695—d. 1753), lived at Burlington House.

Burnet, Gilbert, Bishop of Salisbury (b. 1643—d. 1715), lived and died in Soho-square; lived also in St. John's-square; the shell of this house is still standing.

Burney, Dr. Charles (b. 1726—d. 1815), author of the "History of Music;" a member of the Literary Club; lived in St. Martin's-street, Leicester-square; also in Poland-street, Oxford-street.

Burney, Fanny (b. 1752—d. 1840), authoress; lived in Halfmoon-street, Piccadilly, in the last house on the east side, overlooking Piccadilly; now a turner's shop; also in St. Martin's-street, Leicester-square, at her father's (Dr. Charles Burney's) house; here she wrote her novel of "Evelina."

Byron, George Gordon, Lord, poet; he was born at 24, Holles-street, Cavendish-square; lived in the Albany, Piccadilly, in set No. 2 A; here he wrote his "Lara," in 1811; he had lodgings at No. 8, St. James's-street. The London season of his married life was passed in that half of the Duke of Queensbury's house which is now No. 139, Piccadilly. He lay in state for two days at 25, Great George-street, Westminster.

Cademan, Will. (temp. Chas. II.), player and play publisher. In 1674 he lived at the sign of the "Fop's Head," New Exchange, Strand.

Cadell, Thos. (d. 1802), publisher; published the first and many consecutive editions of Gibbon's "Decline and Fall of the Roman Empire;" lived at a house standing on the site of the present 141, Strand, and died at No. 4, Bloomsbury-place, Bloomsbury-square.

Caius, Dr. John (b. 1510—d. 1573), founder of Caius College, Cambridge; lived in Bartholomew-close.

Camden, Wm. (b. 1551—d. 1623), the antiquary, &c.; born in the Old Bailey; educated at Christ's Hospital, clarencieux of the Herald's College; master of Westminster School; Camden-town named after him. Buried and monument erected to him in Westminster Abbey.

Camden, Ch. Pratt, Earl (b. 1713—d. 1794), Lord Chief Justice and Lord Chancellor; lived and died in Hill-street, Berkeley-square.

Camelford, Thos. Pitt, Lord (b. 1775—d. 1804); the duellist; lived in 1800 at No. 64, Baker-street, Portman-square; also in 1803-1804, at 148, New Bond-street; in 1804, at the Prince of Wales coffee-house, in Conduit-street. He quarrelled with Mr. Best, who killed him in a duel the next day, March 7th, 1804, in the grounds behind Holland-house.

Campbell, John, LL.D. (b. 1708—d. 1775), author of the "Lives of the Admirals," and editor of the "Biographia Britannica;" lived in Queen's-square, Bloomsbury. He is buried in St. George the Martyr, Queen's-square, Bloomsbury.

Campbell, John, Lord; law student in Lincoln's-inn.

Campbell, Thos. (b. 1777—d. 1844), poet; author of the "Pleasures of Hope;" one of the founders of the University College, London. He lived at 30, Foley-place,

Regent-street; also at No. 10, Upper Seymour-street West, where he lost his wife; he was married at St. Margaret's, Westminster; his last London residence was at No. 8, Victoria-square, Pimlico. Buried and a monument erected to him in Westminster Abbey.

Campden, Baptiste Hicks, Viscount (d. 1609), built Hick's Hall at his own expense; lived at Camden House; Camden-hill, Kensington, named after him; he was a mercer, at the sign of the White Bear, at Soper-lane, in Cheapside.

Canning, George (b. 1770—d. 1827), statesman; lived in No. 5A, The Albany; also for some years at No. 35, Conduit-street, Bond-street (now Dr. Elliotson's); was a student in Lincoln's-inn; also resided in 1800 at No. 13, Spur-alley. He was buried and a statue erected to his memory in Westminster Abbey.

Capel, Sir Wm., Lord Mayor (d. 1503-4); lived at the end of Capel-court, Bartholomew-lane, on the site of the Stock Exchange.

Cardigan, Lord (d. circ. 1668); lived in Portugal-row, now south side of Lincoln's-inn-fields.

Carey, Henry (b. 1692—d. 1743), author of the song "Sally in our Alley;" lived in Dorrington-street, Coldbath-fields. Died by his own hand, in Warner-street, Coldbath-fields.

Carew, Thos. (b. 1589—d. 1639); lived in the Strand.

Carlisle, Ch. Havard, 1st Earl of (b. 1618—d. 1684); lived in Newport-street, Long-acre.

Carlisle, Lucy Percy, Countess of (d. 1660), "The Beautiful Countess;" lived in the Strand, near Exeter House.

Carlton, Henry Boyle, Baron (d. 1725); built and lived in Carlton-house, Pall-mall; no longer standing, though the name is perpetuated in Carlton-house-terrace, Carlton-gardens, and the Carlton Club.

Caron, Sir Noel de (d. 1624-5), founded a row of seven almshouses for poor women near the Vauxhall turnpike.

Carpenter, George, Lord (b. 1657—d. 1731), one of the first inhabitants of Hanover-square.

Carr, Sir John (d. 1772), author of the "Caledonian Sketches;" lived in No. 2, Garden-court, Temple.

Carte, Thos. (b. 1686—d. 1754), historian; lived at Mr. Ker's, at the Golden Head, in Newport-street, Long-acre.

Carter, Elizabeth (b. 1717—d. 1806); lived and died in Clarges-street, Piccadilly.

Carteret, John, Lord and Earl of Granville (b. 1690—d. 1763): lived in the last house on the Green-park side, in Arlington-street, Piccadilly.

Cary, Henry, Earl of Monmouth (d. 1626), historian; Monmouth-street, St. Giles's, named after him and his son, who lived in the neighbourhood.

Castlemaine, Roger Palmer, Earl of (d. 1705); lived in 1668 in Berkshire-house, St. James's.

(To be continued.)

Proceedings of Institutions.

EXAMINATION PAPERS, 1867.

The following are the Examination papers set in the various subjects at the Final Examination held in April last:—

(*Continued from page* 659.)

ITALIAN.

THREE HOURS ALLOWED.

Candidates for a first-class certificate must translate the following passages (poetry and prose), and answer the grammatical questions annexed to them:—

Spesso in poveri alberghi e in picciol tetti,
Nelle calamitadi e nei disagi,
Meglio s' aggiungon d'amicizia i petti,
Che fra ricchezze invidiose ed agi
Delle piene d'insidie e di sospetti
Corti regali, e splendidi palagi,
Ove la caritade è in tutto estinta,
Nè si vede amicizia, se non finta.

Quindi avvien che tra principi e signori
Patti e convenzion sono sì frali.
Fan lega oggi re, papi e imperatori;
Doman saran nemici capitali:
Perchè, qual l'apparenze esteriori,
Non hanno i cor, non han gli animi tali;
Chè, non mirando al torto più ch' al dritto,
Attendon solamente al lor profitto.

Questi, quantunque d'amicizia poco
Sieno capaci, perchè non sta quella
Ove per cose gravi, ove per gioco
Mai senza finzion non si favella;
Pur, se talor ha tratti in umil loco
Insieme una fortuna acerba e fella,
In poco tempo vengono a notizia
(Quel che in molto non fer) dell' amicizia.

(Ariosto, Orlando Furioso.)

Incomincio racconto più mesto: la miseria degli abitanti. Al primo tremuoto del 5 di febbraio quanti erano dentro le case della Piana morirono, fuorchè i rimasti mal vivi sotto casuali ripari di travi o di altre moli che nelle cadute inarcarono: fortunati, se in tempo dissepolti; ma tristissimi se consumarono per digiuno l'ultima vita. Coloro che per caso stavano allo scoperto furono salvi, e nemen tutti; altri rapiti nelle voragini che sotto ai piedi si aprivano, altri nel mare dalle onde che tornavano, altri côlti dalle materie proiettate dal turbine, infelicissimi i rimanenti, che miravano rovinate le case, e soggiacenti la moglie, il padre, i figliuoli. E poichè, anni dopo, io stesso ragionai co'testimonii della catastrofe e con uomini e donne tratti dalle rovine, potrò, quanto comporta l'animo e l'ingegno, rappresentare le cose morali de'tremuoti delle Calabrie, come finora ho descritto più facilmente le parti fisiche e materiali.

Alla prima scossa nessun segnale in terra o in cielo dava timore o sospetto; ma nel moto ed alla vista dei precipizi, lo sbalordimento invase tutti gli animi, così che, smarrita la ragione e perfino sospeso l'istinto di salvezza, restarono gli uomini attoniti ed immoti. Ritornata la ragione, fu primo sentimento de'campati certa gioia di parziale ventura, ma gioia fugace perchè subito la oppresse il pensiero della famiglia perduta, della casa distrutta; e fra tante specie presenti di morire, e il timore di giorno estremo e vicino più gli straziava il sospetto che i parenti stessero ancora vivi sotto le rovine, sì che, vista l'impossibilità di soccorrerli, dovevano sperare (consolazione misera e tremenda) che fossero estinti. Quanti si vedevano padri e mariti aggirarsi frai i rottami che coprivano le care persone, non bastare a muovere quelle moli, cercare invano aiuto ai passeggieri; e alfine disperati gemere dì e notte sopra quei sassi. Nel quale abbandono de'mortali rifuggendo alla fede, votarono sacre offerte alla divinità, e vita futura di contrizione e di penitenza; fu santificato nella settimana il mercoledì, e nell'anno il 5 di febbraio; ne'quali giorni, per volontari martori e per solemni feste di chiesa speravano placare l'ira di Dio.

(Colletta, Storia del Reame di Napoli.)

Grammatical Notes from Ariosto.

1. *Estinta:* Give the infinitive and the whole present tense of the indicative.
2. *Vede:* This verb has three different forms for the first person singular of this tense. Give them.
3. *Attendon:* Write the whole of the preterite tense.
4. *Questi:* Here stands for the plural of *questo*. What other meaning has this word?
5. *Sieno:* How may this verb be otherwise written?
6. *Tratti:* Write the first person singular of the present, preterite, and future.
7. *Fer:* Give the other forms of this word.

GRAMMATICAL NOTES FROM COLLETTA.

1. *Morirono :* Give the whole present tense of the indicative.

2. *Rimasti :* Give the whole present and future tense.

3. *Dissepolti :* Give the whole present tense of the indicative.

4. *Còlti :* Give the two infinitives of this.

5. *Ritornata :* What auxiliary verb, and in what mood, is here understood in the sentence ?

6. *Muovere :* Give the whole of the preterite tense.

Translate into Italian :—

"And this," said he, putting the remains of a crust into his wallet, "and this should have been thy portion, hadst thou been alive to have shared it with me." I thought, by the accent, it had been an apostrophe to his child, but it was to his ass; and to the very ass we had seen dead on the road, which had occasioned La Fleur's misadventure. The man seemed to lament it much; and it instantly brought into my mind Sancho's lamentation for his; but he did it with more true touches of nature. . . . . The simplicity of his grief drew numbers about him, and La Fleur among the rest. While the horses were getting ready, as I continued sitting in the post-chaise, I could see and hear over their heads. He said he had come last from Spain, where he had been from the farthest borders of Franconia; and had got so far on his return home when the ass died. Every one seemed desirous to know what business could have taken so old and poor a man so far a journey from his own home. It had pleased Heaven, he said, to bless him with three sons, the finest lads in all Germany; but, having in one week lost two of them by the small-pox, and the youngest falling ill of the same distemper, he was afraid of being bereft of them all, and made a vow, if Heaven would not take *him* from him also, he would go in gratitude to St. Iago, in Spain. When the mourner got thus far in his story, he stopped, to pay nature her tribute, and wept bitterly. He said Heaven had accepted the conditions, and that he had set out from his cottage with this poor creature, who had been a patient partner of his journey; that it had eaten the same bread with him all the way, and was unto him as a friend.

(STERNE, The Dead Ass.)

ITALIAN IDIOMS.

(To be translated into their English equivalents.)

Andò a marito giovinetta.
Non siete mai all' ordine.
Mettiamoci al coperto.
Mise mano alla spada.
Sono sempre sfaccendati.
Non mi darebbe il cuore d' ingannarlo.
Fatevi animo.
Gli volsi le spalle.
M'andò fallito il colpo.
Diè di piglio ad un bastone.
Le rispose con piglio severo.

Candidates for second or third-class certificates are required (1) to translate into English the following extracts, and (2) to answer the grammatical questions given below.

Manlio. A che vieni ?
Attilia. A che vengo ! Ah sino a quando
Con stupor della terra,
Con vergogna di Roma, in vil servaggio
Regolo ha da languir ? Scorrono i giorni,
Gli anni giungono a lustri, e non si pensa
Ch' ei vive in servitù. Qual suo delitto
Meritò da' Romani
Questo barbaro obblio ? Forse l' amore
Onde i figli e sè stesso
Alla patria pospose ? Il grande, il giusto,
L' incorrotto suo cor ? L' illustre forse
Sua povertà ne' sommi gradi ? Ah come
Chi quest' aure respira
Può Regolo obbliar ! Qual parte in Roma
Non vi parla di lui ? Le vie ? Per quelle
Ei passò trionfante. Il Foro ? A noi
Provvide leggi ivi dettò. Le mura
Ove accorre il senato ? I suoi consigli
Là fabbricar più volte
La pubblica salvezza. Entra ne' tempii,
Ascendi, o Manlio, il Campidoglio, e dimmi,
Chi gli adornò di tante
Insegne pellegrine
Puniche, siciliane e tarentine ?
Questi, questi littori,
Ch' or precedono a te; questa, che cingi,
Porpora consolar, Regolo ancora
Ebbe altre volte intorno: ed or si lascia
Morir fra' ceppi ? Ed or non ha per lui,
Che i pianti miei, ma senza pro versati ?
Oh padre ! Oh Roma ! Oh cittadini ingrati !

(METASTASIO, Attilio Regolo.)

Se m' è dato lo sperare mai pace, l' ho trovata, o Lorenzo. Il parroco, il medico e tutti gli oscuri mortali di questo cantuccio della terra mi conoscono sin da fanciullo e mi amano. Quantunque io viva fuggiasco, mi vengono tutti d' intorno quasi volessero mansuefare una fiera generosa e selvatica. Per ora io lascio correre. Veramente non ho avuto tanto bene dagli uomini da fidarmene così alle prime: ma quel menare la vita del tiranno che freme e trema d' essere scannato a ogni minuto, mi pare un agonizzare in una morte lenta, obbrobriosa. Io seggo con essi a mezzodì sotto il platano della chiesa leggendo loro le vite di Licurgo e di Timoleone. Domenica mi s' erano affollati intorno tutti i contadini che, quantunque non comprendessero affatto, stavano ascoltandomi a bocca aperta. Credo che il desiderio di sapere e ridire la storia de' tempi andati sia figlio del nostro amor proprio, che vorrebbe illudersi e prolungare la vita unendoci agli uomini ed alle cose che non sono più, e facendole, sto per dire, di nostra proprietà. Ama la immaginazione di spaziare fra secoli e di possedere un altro universo. Con che passione un vecchio lavoratore mi narrava stamattina la vita de' parrochi della villa viventi nella sua fanciullezza, e mi descriveva i danni della tempesta di trentasett' anni addietro, e i tempi dell' abbondanza, e quei della fame, rompendo il filo ogni tanto, ripigliandolo, e scusandosi dell' infedeltà ! Così mi riesce di dimenticarmi ch' io vivo.

(UGO FOSCOLO, Ortis, Ultime Lettere.)

GRAMMATICAL QUESTIONS.

1. Show, by a few suitable examples, how to express (in Italian) the comparative of equality, superiority, and inferiority respectively.

2. Give the precise meaning (in English) of the following augmentatives and diminutives :—*Ragazzone, libraccio, casettina, giardinetto, cavalluccio, scrittorello, grandicello, biancastro, carino, caruccio.*

3. Write the conjunctive personal pronouns, in the dative and accusative, for the three persons singular; and explain when they should precede and when follow the verb.

4. Write, with the conjunctive personal pronouns in their proper position, the persons given of the following verbs :—I saw her (*vedere*); he knows us (*conoscere*); speaking to her (*parlare*); listen to me (you) (*sentire*); do not believe (to) him (*credere*); they did it (*fare*); I went to take them (*andare, prendere*); that I might say to them (*dire*); give me (thou) (*dare*).

(To be continued.)

PARIS EXHIBITION.

The number of visitors to the Exhibition has greatly increased again, as was to be expected from the collegiate and school vacations; the highest number attained during the last week was 71,415, and the lowest about

38,000. The vintage has commenced in some parts of the country, and will generally be finished in the course of the present month, when another large body of provincial visitors will be enabled to visit Paris. The visit of the Emperor and Empress of Austria, which is announced for the 10th of October, will also have a beneficial effect on the Exhibition.

The price of tickets for the rest of the season has been reduced from forty to twenty francs, and the admission to the park, after six o'clock, from one franc to half that sum. Had this been done while the evenings were hot, it might possibly have had an effect upon the evening attendances, but the attempt to unite evening amusements with an industrial exhibition is generally regarded as a mistake; there has never been more than a sprinkling of visitors in the evening, and the few entertainments attempted have all, or very nearly all, been failures. The effect of the Exhibition on the amusements of the city has been most favourable, as an official return of the receipts of the Paris theatres clearly indicates; compared with the five months of last year, commencing with April, the present year shows an excess of £100,850, the totals being relatively 4,666,856f. and 7,188,096f. It is to be noted also that the increase did not commence till May, the previous month showing an absolute decline; so that April would seem to have been too early a month for opening the Exhibition, and this is the general opinion out of doors.

As regards the refreshment department, the establishments at the exhibition have, we understand, been successful or otherwise in proportion to the moderation of the charges; the *Restaurant Omnibus*, established for the benefit of the working classes, has furnished as many as 8,588 meals in one day, and possibly that is not the highest number.

The shows of grapes have commenced in the horticultural gardens annexed to the Exhibition. The first consisted chiefly of table grapes: there were only about eight exhibitors, but more than one of these contributed two hundred varieties, including the *Chasselas de Fontainebleau*, probably the finest grapes produced out of doors in Europe. The centre of production of these dessert grapes is Thomery, with a railway station on the Lyons line, about three miles beyond Fontainebleau, a most interesting spot, well worth a visit at the present season.

It is said that a committee has been formed at Berlin for the arrangement of a plan for a universal exhibition to be held in that city in the year 1872.

TECHNICAL EDUCATION IN AUSTRIA.

The following account of an important institution at Vienna appears in the *Engineer*:—

The Imperial Royal Polytechnic Institution at Vienna, the rules of which we give below, was established in 1816 for the object of promoting instruction in the practical sciences. At first it formed a kind of preparatory school for artisans, but has since been gradually extended, and improved into what may be termed a scientific university. Properly speaking this more dignified title is only due to it since October, 1865, when by imperial decree it was created a "Hochschule," power being given to it to grant diplomas, and the entire course of education being made strictly compulsory, whilst a higher scale of knowledge was demanded from students applying for admission. The fees paid by most of the students (the total number of whom averages 600 annually) amounting to only about £5 per annum, or say £9, including laboratory and drawing fees, &c. This Institution is to a considerable extent supported by the state, the management being conducted by a committee of professors, who annually elect from among themselves a president—the so-called "Rector" and nominal head of the institution. The salaries of the professors amount to respectively 1,800, 2,900, 3,400, and 3,900 florins per annum. There are altogether twenty-six professors, three salaried "Docenten" (minor professors), ten unsalaried "Docenten," eight teachers of languages, stenography, sketching, and modelling, three "Adjunkten" (special assistants), and twenty-three assistants. An annual sum of 13,000 florins is given by the state for development and expenses of the twenty different laboratories and collections, of which 2,000 florins go to the laboratory for chemical technology, 1,250 florins to the laboratory for analytical and general chemistry, 1,500 florins to the engine building collection, and 1,500 florins to the mechanical technology collection. A special fact worth mentioning is that students passing all their examinations with "vorzug" (excellence) are exempt from military service. Besides, students liable to military service may, on passing a satisfactory examination on technical subjects before a military commission, enter as cadets instead of being compelled to serve as private soldiers. An exceedingly useful and altogether excellent system is embodied in the so-called scientific excursions made at certain intervals by the professors and students of botany, zoology, geology, mechanical technology (including metallurgy), chemical technology, agriculture, surveying, and mechanical and civil engineering. In these excursions various manufactories and works are visited, botanical and geological expeditions of great length made; in fact every means adopted for giving the students a practical as well as theoretical knowledge whenever possible. It only remains to be said that most of the students enter at about eighteen or nineteen years of age, having generally previously passed through an education of six annual courses in the Realschulen (Government schools, where solely technical subjects, entirely excluding the ancient languages, are taught), preceded by four annual courses in the Hauptschulen (preparatory Government schools for children).

*Regulations of the Imperial Royal Polytechnic Institution in Vienna.**

I.—General Regulations.

Sec. 1.—The Vienna Polytechnic Institution is intended to afford a thorough theoretical, and also, as far as possible, practical education for the professions which are represented in it by special preparatory divisions.

Sec. 2.—The following divisions exist in the Institution:—A, the *general division*, in which those subjects are taught which form the scientific basis of the subsequent special studies; B, the division for *civil engineering*; C, for *building*; D, for *mechanical engineering*; E, for *technical chemistry*.

Sec. 6.—The instruction in the separate subjects is given partly in annual terms lasting from 1st of October to the end of July, and partly in biennial terms, the first ending in February, and the other beginning 1st of March.

II.—Regarding the Students.

Sec. 7.—The students are divided into *ordinary*, that is, those who are matriculated either for the general division or one of the special divisions, and who attend the entire course of education according to the proper regulations; and into *extraordinary*, that is, those who only attend certain lectures.

Sec. 8.—The ordinary students are designated as such in the certificates; they have all the rights connected with attending the Institution, and have to fulfil all the appertaining duties. The extraordinary students have in general the rights of the ordinary, but are not admitted to the "rigorosum" examinations (strengen Prüfungen, sec. 28); neither have they any right to scholarships. In the public certificates they are expressly designated as extraordinary students. Disregarding any special exceptions their duties are the same as those of the ordinary students. All students are subject to the disciplinary regulations. The ordinary students are subject, as regards discipline, to the heads of the divisions, the extraordinary to the rector.

* According to Imperial decree of 17th October, 1865.

Sec. 9.—Only those can enter as ordinary students into the first session of the general division who have either—1, absolved the upper Realschule, or upper gymnasium, with proper certificates; or, 2, passed with good results the "maturitäts" examination at a Realschule authorised thereto by the Government, not having been educated at a middle school. Gymnasium scholars must also prove sufficient readiness in geometrical and general drawing.

Sec. 10.—As long as "maturitäts" examinations are not regularly introduced into the Realschulen, those who are unable to show the proper certificates have to be subjected to an entrance examination at the Polytechnic Institution. Those mentioned in sec. 9, heading 2, must be at least seventeen years of age. The following are the subjects of the entrance examination:—*a*, arithmetic, algebra, geometry, plane and spherical trigonometry, analytical plane geometry; *b*, geography and history; *c*, physics; *d*, natural history; *e*, geometrical and general drawing; *f*, readiness in German style, to be proved by an essay on a given subject. The subjects from *a* to *e*, to the extent taught in the upper Realschulen, are accurately detailed in the special programme published by the Institution. A fee of five florins has to be paid for the entrance examination, which is received by the examiners.

Sec. 11.—Students just entering, who wish to be admitted as ordinary students to higher divisions, have—1, to fulfil the general entrance regulations (sec. 9), and, 2, to prove the necessary proficiency either by legal certificates, or by subjecting themselves to a gratuitous examination.

Sec. 12.—The following conditions have to be fulfilled by those wishing to enter as extraordinary students:—1, an age exceeding seventeen years; 2, proofs of the preliminary knowledge necessary for successfully attending the desired lectures. These proofs must be afforded either by legal certificates or by an entrance examination. For each subject of examination in this case an examination fee of two florins must be paid.

Sec. 13.—The entrance of ordinary students takes place at the beginning of the school year. They have to announce themselves personally, on or before the 7th of October, to the head of the division which they intend entering, and have to deliver to the same their *nationale* (written statement of name, age, birthplace, name and position of parents, &c.), together with any other necessary explanations. The head of the division examines the written statements as to whether they fulfil the necessary conditions, and makes, if necessary, the arrangements respecting the entrance examinations. He then delivers to the applicant an attestation of his matriculation, in which the division and session into which he has been admitted, as well as the selected subjects, are detailed. In doubtful cases the determination respecting the admission of the applicant is left to the decision of all the professors of the division.

Sec. 14.—The announcement of extraordinary students has to be made in the same way to the professors of those subjects which the students wish to attend. For those lectures which are only delivered in the summer term the registration can only take place in the beginning of the second term.

Sec. 15.—As soon as the conditions mentioned in secs. 9 to 14 have been fulfilled, and as soon as the fees stated in secs. 19 to 21 have been paid, the matriculation of newly-admitted students, as well as the registration of already matriculated students, can take place.

Sec. 16.—The ordinary students have, as a rule, to adhere to the plan of study determined for the general and special divisions. Exceptionally they may be allowed to form another plan, in which case they must obtain the permission of the professors of the divisions in question. But this permission can only be given when in the plan selected, firstly, regard has been taken of the proper sequence of studies depending upon and supporting each other; and, secondly, when the total sum of all the weekly hours for the selected subjects amount to at least eighteen, each two practice or drawing hours being reckoned as one.

Sec. 17.—Besides the subjects contained in his plan of study, the ordinary student may also attend lectures concerning other subjects for which he has sufficient preparatory knowledge. The statement of this has to take place either at the announcement (sec. 13), or at the latest on the 15th of October or 15th of March (sec. 6), and personally to the rector.

Sec. 18.—The students are also allowed, within certain limits, to attend the drawing-schools and laboratories at other hours besides those fixed in the plan of study.

Sec. 19.—Each student has, on first admittance to the Institution, to pay a fee of five florins. After an absence of one year or more the same amount has to be again paid.

Sec. 20.—Each ordinary student, to whatever division he may belong, and without regarding the number of the lectures he may select, has to pay a fee of fifty florins for the whole year. This fee may be either paid entire on admittance, or in two parts, of which the first is due on admittance, the second, at the latest, on the 7th March.

Sec. 21.—The fees to be paid by the extraordinary students are so calculated that for each hour per week during each biennial term, one florin fifty kreutzers has to be paid, each two practice or drawing hours being reckoned as one.

Sec. 22.—The extraordinary lectures of the professors, the lecturers of the assistants, and of the teachers not paid by the Government, have to be paid for according to the fees determined upon by the same.

Sec. 23.—By proving poverty, and at the same time proficiency, students may be either entirely freed from paying the fees (secs. 20 and 21), or only subject to half the charges.

Sec. 24.—From the *viva voce* and written examinations held during the year and at the end of the same, as well as from the other tasks delivered by the student, the result of his studies in the separate subjects is determined. The determination as to whether a student is altogether proficient enough to advance into a higher course is left to the divisional committee of professors. If a student has failed in the examination of any one subject, he will have to prove his proficiency in the subject at the beginning of the next session, up to at the latest the 7th October, paying for this examination a tax of five florins. If he omits to do this, or again fails, then his further advancement in his studies can only be allowed if the subject in question is not one the knowledge of which is indispensable for the proper study of the chief subjects in the next course. And in this case only those subjects must be attended for which a previous knowledge of the one failed in is not necessary. But for the advancement from the general division into a special division, at least a "sufficiently good" result must have been obtained in all the subjects given in the plan of study for the general division. Students who have been compelled to repeat a course are allowed to attend single subjects of the next following course of the next division, provided they are able to prove sufficient preparatory knowledge for each subject. The repetition of a subject attended with insufficient result, as well as the repetition of a course, is only allowed once.

Sec. 25.—Each ordinary student obtains at the close of the year a certificate, in which the attendance of, and result in each of the subjects of his division, as well as his general conduct, are specified. Similar certificates, but only for each single subject, are given to the ordinary student upon his attending not compulsory subjects. These latter certificates are the same as those which are given to the extraordinary students. The result is designated in the certificates—"excellent," or "good," "efficient," or "insufficient." The conduct is

designated either "entirely according to," or "according to," or "less according to the academical laws." The ordinary students can also obtain certificates of attendance for subjects not compulsory.

Sec. 26.—The resigning the attendance of single lectures has to be intimated to the respective professors; the leaving the Institution to the rector.

Sec. 27.—Under the name of guests, males may be admitted to the lectures on separate subjects, by permission of the respective professors, who, from their station and other qualifications, entitle the expectation that the objects of the teaching will not be prejudiced thereby.

III.—Regarding the Strict (Rigorosum) Examinations for obtaining a Diploma.

Sec. 28.—The strict examinations are intended to prove the efficiency of the candidate for his profession. They have to show that the candidate has a complete knowledge of all the subjects of examination, both theoretically and practically, and particularly of the amount taught in the special professional division. A diploma is given on completing the strict examination.

Sec. 30.—The candidate for the strict examination has to prove at least sufficient proficiency in all the subjects contained in the plan of study of the division in question, and also in national economy, in the laws of trade and exchange, and in book-keeping.

Sec. 31.—A fee has to be paid for the strict examination: it amounts to 150 florins for each of the divisions for civil engineering, building, or mechanical engineering; and to 80 florins for the technical chemistry division. The fee in question has to be paid beforehand, and no gratuitous examination will be granted.

Secs. 32 and 33 contain further unimportant particulars concerning the strict examinations.

Sec. 34.—Should the result be insufficiently good, the strict examination can be repeated. This repetition can only take place once, and only after the expiration of the time fixed by the examining committee. The fee due for the examination has in this case to be again paid.

Sec. 35.—The subjects for the strict examination to the extent taught in the respective divisions are the following:—

B.—*Civil Engineering Division.*—1. Mathematics, geometrical drawing, technical physics, theoretical mechanics, machinery; 2, practical geometry and higher geodesy, building mechanics, building construction, road and hydraulic engineering.

C. *Building Division.*—1, Mathematics, geometrical drawing, technical physics, mechanics, machinery, geology; 2, practical geometry, building mechanics, building construction, history of building, road and hydraulic engineering.

D. *Mechanical Engineering Division.*—1, Mathematics, geometrical drawing, technical physics, mechanics, practical geometry; 2, general building construction, laws of machinery, building of machinery, and mechanical technology.

E. *Technical Chemistry Division.*—Mineralogy, botany, and zoology, general and technical physics, machinery, chemistry, chemical technology, and knowledge of goods.

Sec. 36.—The strict examination may be passed for more than one division, provided the rules of secs. 30 and 31 be adhered to. In this case the examination committee may grant a dispensation from examination in those subjects of the next division in which the candidate has been examined in the former division.

Plan of Study for the Year 1866-67.

A.—*For the General Division.*

Both the annual sessions of this division have to be passed by students wishing to enter the civil engineering, building, or mechanical engineering divisions. Students intending to enter the chemical division need only pass the first session of the general division; such students need not attend the geometrical drawing, taking instead the lectures on Mineralogy and the laboratory practice. —*First Session.*—Mathematics (algebraic analysis, analytical geometry, elements of differential and integral calculus), 10 hours weekly; geometrical drawing, 7 hours; constructional drawing, 8 hours, inorganic chemistry, 3 hours; zoology, 6 hours (in the winter term); botany, 6 hours (in the summer term); technical and free drawing, 7 hours. *Second Session.*—Mathematics (differential and integral calculus), 5 hours; physics, 4 hours; technical mechanics, 5 hours; practical geometry, 4 hours; situational drawing *(Situational Zeichnen)*, 6 hours; mineralogy, 5 hours; constructional exercises in geometrical drawing, 4 hours; technical and free drawing, 4 hours.

B.—*Civil Engineering Division.*

First Annual Session.—Technical physics, 3 hours; knowledge of machinery, 3 hours; constructive practice, 5 hours; building (course 1), 5 hours; constructional drawing, 10 hours; geology (course 1 in winter), 2 hours; geology (course 2 in summer), 8 hours, geological practice (in summer), 2 hours; ornamental drawing, 6 hours. *Second Annual Session.*—Analytical mechanics, 2 hours; building mechanics, 2 hours; spherical astronomy (in winter), 4½ hours; higher geodesy (in summer), 4½ hours; hydraulic and bridge engineering, 5 hours; constructional exercises and plans, 10 hours; tracing *(Terrain Lehre)*, in summer, 2 hours. *Third Annual Session.*—Road and railway engineering, 5 hours; constructional exercises and plans, 15 hours; artistic perspective (in winter), 2 hours; perspective and landscape drawing, 4½ hours.

C.—*Building Division.*

First Annual Session.—Building (course 1), 5 hours; building construction exercises, 10 hours; knowledge of machinery, 3 hours; constructional exercises, 5 hours; geology (in winter), 2 hours; mechanical technology (in winter), 5 hours; ornamental drawing and modelling, 6 hours. *Second Annual Session.*—Art of building, 3 hours; practice in architectural drawing and planning; encyclopædia of road and hydraulic engineering (in summer), 4 hours; building mechanics, 2 hours; technical physics (in winter), 2 hours; perspective and landscape drawing, 6 hours; ornamental drawing and modelling, 4 hours. *Third Annual Session.*—The particulars concerning this session will only be published for 1867-8.

D.—*Mechanical Engineering Division.*

First Session.—Analytical mechanics, 2 hours; laws of machinery (*Maschinen Lehre*), course 1, 3 hours; building of machinery (*Maschinen Bau*), course 1, 3 hours; constructional exercises, 10 hours; mechanical technology, 5 hours; technical physics, 3 hours; knowledge of building, 2 hours; building drawing, 6 hours. *Second Session.*—Laws of machinery (course 2), 2 hours; building of machinery (course 2), 10 hours; constructional exercises and plans, 15 hours; chemical technology (sugar manufacturing and brewing), 7½ hours.

E.—*Chemical Technical Division.*

First Session.—Organic chemistry, 3 hours; analytical chemistry, 2 hours; laboratory practice, 10 hours; general physics, 4 hours; technical mechanics, 5 hours; mineralogy (in winter), 5 hours. *Second Session.*—Chemical technology (sugar manufacturing, brewing, dyeing, tanning, soap manufacturing, distilling, wines, &c.), 7½ hours; laboratory practice, 20 hours; technical physics, 3 hours; knowledge of machinery, 3 hours; knowledge of goods, 2 hours. *Third Session.*—Laboratory practice, 20 hours; knowledge of building (in winter), 4 hours; mechanical technology (metallurgy, working of metals, working of wood, spinning, paper manufacturing, &c.), 5 hours; geology (course 1 in winter), 2 hours; geology (course 2 in summer), 5 hours.

Lectures not appertaining to any Division in particular.

Modern history, history of Austria, zoological palæontology, history of German literature, the German classics, essays and declamation, esthetics, agriculture (courses 1 and 2), national economy (courses 1 and 2),

laws of trade and barter, statistics, political laws of Austria, book-keeping, business style, modelling.

Extraordinary Lectures.

Integration of lineal differential equations, geometry of position and graphical calculations, political arithmetic and assurance, graphical statics, mathematical crystallography, crystallographic physics, anatomy of plants, botanical physiology, chemistry of the alcohols, psychology and logic, ornamental drawing, accidental surgery.

Languages and Accomplishments.

French, English, Italian, Persian, Turkish, Vulgo-Arabic—Stenography.

Fine Arts.

Decorations of the New Opera House of Paris.—The reports of the intended decorations of the new Opera House have been so extraordinary, that most people believed them to be exaggerated; this, however, is not the case, as the following list, supplied by M. Garnier, the architect of the new building, to the *Moniteur des Arts*, will show:—The paintings ordered, and in course of execution, are, for the grand public saloon, ten subjects for the covings of the ceilings from mythology and history: "Orpheus," "Education of Jupiter," "Bacchantes," "Judgment of Paris," &c., by M. Paul Baudry; "Parnassus," terrestial and divine, to fill two large covings; and ten oval medallions over the doors, by the same. A room to the left of the above, to be decorated by M. Delaunay, the ceiling with a "The Glorification of Singing," and three tympans, continuing the subject. The corresponding room on the other side, "Harmony," in a ceiling and three tympans, by M. Barrias. The great saloon for the ballet: four panels representing the various phases of the dance, and twenty portraits of famous dancers, by Gustave Boulanger. Grand staircase: four subjects, "Art," "Music," "Poetry," and "The Dance," in large compartments, by M. Pils; and twelve works in enamel, by M. Emile Solier, representing as many cities where famous operas have been produced, London included. A grand cupola, by M. Jules Lenepveu, "The Gods and Goddesses on Olympus," representing the symbolic arts; three landscapes by MM. Félix Thomas, Lanoue, and Harpignies. The above are all ordered, and the following are proposed to be added to the list:—Four grand panels, and three tympans, with figures on a ground of gold, for an anteroom; a grand allegorical ceiling for the Imperial saloon, and five panels for the antechamber to the saloon; panels and friezes for the Empress's boudoir; eight tympanums in the Imperial vestibule. Smoking-room: eight historical figures, with plans, representing the eight places which have been used for operas in Paris; a ceiling and eight medallions for the large ice-room; friezes for the small ice-room; twelve panels, containing figures representing as many kinds of dances, for the café; and lastly, twenty portraits of celebrated singers, by Gérôme, de Curzon, Chifflard, Laëinlin, Brisset, Giacomotti, Biennoury, Lévy, Auber, Leconte de Roujou, Balleroy, Ph. Rousseau, Monginot, Gendron, Landelle, Hamon, Marchal, Giraud, Saintin, Wetter, Français and Benouville. The sculpture is in keeping with the painting. On the principal façade of the building above, four groups by M. Maillet; below, groups representing the "Dance," "Harmony," "Comedy," and the "Drama," and "Singing" and "Music," by Carpeaux, Jouffroy, Perrand, and Guillaume; and in the centre, statues representing the "Idyl," "Elegy," "Mythology," and "History," by Aizelin, Chapu, Dubois, and Falguières. On the two frontons of the same façade, figures of "Architecture" and "Industry," by Jean Petit, and painting and sculpture, by Gruvère. On the two lateral façades, frontons representing "Comedy" and the "Drama," by Girard, "Art" and "Science," by Maniglier; the "Drama" and "Music," by Ottin; and "Singing" and "Poetry," by Cabet. The grand galvano-plastic groups, by Gummery, representing "Poetry" and "Music," supported by figures of Fame. Over the centre of the proscenium, a galvano-plastic group, "Apollo holding the lyre," and two allegorical figures, by Ainé Millet; and in the angles, "Pegasus restrained by the Muses." On the frontons of the Imperial pavilion, the arms of France, with attributes, by Pollet and Travaux. On the Imperial staircase, four "Cariatides," by Elias Robert and Mathurin Moreau. On the principal façade, gilt bronze busts of Mozart, Meyerbeer, Spontini, Beethoven, and Auber, by Chabaud; and of Halévy, Rossini, Quinault, and Scribe, by Everard. On the lateral façades, busts in stone of Cambra, Cambert, J. J. Rousseau, Philidor, Piccini, and Paisiello, by Hasse; Cherubini, Mehul, Nicolo, Weber, Bellini, and Adam, by Denécheau; Monteverde, Durante, Jomelli, Monsigny, Grétry, and Sacchini, by Walter; and Leseur, Berton, Boïeldieu, Hérold, Donizetti, and Verdi, by Bruyer. Medallions on the façade, of Pergolesi, Haydn, Bach, and Cimarosa, by Gummery. Two grand candelabra, allegorical of the moon and the stars, by Chabaud. In the interior of the building, four seated statues of Lulli, Rameau, Gluck, and Handel, representing Italian, French, German, and English music, artists not yet appointed. On the grand staircase, two "Cariatides" in coloured marble, by Jules Thomas. In the grand saloon, two "cariatides," flanking the chimney-piece, by Carrier Belleuse and Cordier. In the theatre itself, "cariatides," at the Imperial and opposite boxes, by Cranck and Lepère. It is proposed, in addition to the above, to place twenty plaster figures in the grand saloon, with busts of living composers, bas-reliefs and ornaments. Over the Imperial pavilion are eagles, by Caën, while others by Jacquemart and Rouillard crown the columns and guard the entrance.

Manufactures.

New Process for Sugar Making.—Mr. Knaggs, of Seven Plantations Estate, Lower Clarendon, Jamaica, himself a practical sugar producer, has invented machinery for the manufacture of sugar, the object of which is to enable white crystalline sugar of the best quality to be produced direct from the juice on the estate of the cane planter. An account of this machinery appeared in the *Standard*, and has been quoted in the *Produce Markets Review*. The inventor, bearing in mind the necessity for the speedy grinding of the cane, and the thorough cleansing of the mill, pump, gutter, and all other surfaces with which the juice may come in contact, begins with the application of sulphurous acid gas as soon as possible after expression. This he effects by burning sulphur, and forcing the gas generated into the fluid in the tank. The liquor is then pumped into the clarifiers, where it is treated with the gas, which is forced continually into the cistern during the whole time the mill is at work. The juice after gasing is rapidly brought up to the boiling point, and the scum thrown up removed. Cretaceous earth is used to neutralise the sulphurous acid; and the clarification is effected by the manganate or permanganate of soda, or of potash and lime. The liquor is then drawn into a subsider, a vessel intermediate between the clarifiers and the coppers, or more properly, in Mr. Knaggs' process, the evaporator, which is of considerable dimensions, and in outer appearance has much the aspect of an ordinary fixed boiler, with a couple of furnaces beneath. The fire of these furnaces plays around a great number of vertical tubes, pendant from the boiler itself, which is 18 feet long by 6 feet wide, and one foot in depth. Upon the upper surface of this is formed the evaporator, a shallow pan of like dimensions. The fluid flows into this, and covers a

number of horizontal steam tubes, which penetrate its entire mass, and heat it thoroughly throughout its depth and extent; the heat passing from the pipes to the juice, the steam within them is condensed, and returned to the boiler. By this arrangement an extraordinary amount of evaporation is effected, far exceeding what would be estimated by the usual formula. The juice is converted into syrup in a continuous stream, and cannot at any time come into contact with surfaces heated above 230 degrees, and consequently charring or blackening of the syrup is impossible; and contact with the air is avoided by the arching over of the evaporator. The juice having been brought to a state of syrup, it passes on continuously to the granulator, in which the granulation is effected at a low temperature. This granulator consists of a long oval metal trough, encased in a jacket. Inside the oval trough are packed a number of steam tubes, which communicate at either end with the space between it and the jacket, so that the boiled-down syrup coming in from the evaporator is heated by the steam pipes and trough to 212 degrees. A laminated revolver or drum, diagonally fitted with a number of long thin blades, keeps turning up the syrup. These blades offer a large extent of surface, and continually expose thin films of heated syrup on both sides to a rapid evaporation. To increase the action, heated air is driven into the interior of the drum, and passes over the revolving blades, accelerating by its capacity for the absorption of vapour the granulation of the syrup upon them. The heat for all this portion of the apparatus is derived entirely by the utilisation of the waste steam arising from the first evaporation; and the temperature need never exceed 170 degrees. The grain of the sugar produced is quite equal to that made in a vacuum. The process is constantly in operation, and the juice, during the whole period of its concentration, is never subjected to any lengthened detention in any particular stage, nor to any injurious degree of heat. The apparatus can be made to cleanse itself effectually; there is no necessity of discontinuing work for the night; a few hands can attend to all requirements; no personal judgment or constant supervision is needed, and the robberies extensively carried on in the plantations could not be perpetrated when no syrup or sugar is exposed to pilfering hands. Mr. Knaggs' system also includes a novel still, and an apparatus for drying megass, both of which are worked by means of the waste steam from the evaporator. Another advantage of the new sugar apparatus appears to be that, having been supplied with a small quantity of water at starting, it continues not only without any further supply, but actually condenses a constant stream in the process of the evaporation of the juice. This feature is one which will be thoroughly appreciated in all dry tropical countries.

Commerce.

State of Commerce in France.—There is a slight improvement in the returns of imports and exports; the official returns show not only that the deficiency of exports, as compared with 1866, ceased with the month of May, but that the exports of June exceeded those of the same month last year by 3,288,000 francs (£131,520). It is remarkable that, in France, while the exports of the six months exhibit a deficit of more than 195,000,000 of francs, the imports during the same period exceed those of 1866 by 141,500,000; the principal cause of this excess was the badness of the last harvest, the imports of cereals, and other alimentary substances, amounting to 438¾ millions against 405½ millions of export. The item of fuel, metals, and machinery, also shows 187¾ millions of imports against 39 millions of exports; but the largest difference between imports and exports is naturally in the raw materials of the manufactures, the imports of which amount to 790½ millions against 247¾ millions of exports. The following are the totals of imports and exports of the six months in millions of francs, in the sections of metallurgy and machinery:—

Minerals of all kinds..	9·6	imports.	.. 4·8	exports.
Iron and steel.....	7·8	,,	.. 0·2	,,
Other metals	59·7	,,	.. 6·0	,,
Coal and coke	65·0	,,	.. 2·1	,,
Arms, ammunition of war, ships, boats, &c.	9·2	,,	.. 3·7	,,
Machinery, tools, &c.	10·5	,,	.. 18·3	,,

Of the last item of export four millions of francs belong to the month of June. The movement in shipping also bears witness to the improvement in commerce, the entries for June having been 5,186 vessels, of a total burthen of 916,627 tons, being an increase, as compared with the average of the five previous months, of more than 900 vessels and 67,118 tons.

Colonies.

Colonial Maizena.—A Sydney paper says:—"The article known as Maizena has now come into very general use. This substance is ground maize, finely dressed. Its preparation resembles that of arrowroot, and the operation is simple. The corn is gathered just before it begins to harden, reduced to a pulp, and mixed with water; it is then strained through a coarse sieve. The liquor is placed on vessels from which the moisture departs by evaporation, leaving the maizena ready for packing. Many people seem confident that the colony will be able to compete with the English manufactured article, if not by selling at a lower rate, yet by selling a better quality at the same price. There is scarcely any country where the raw material can be obtained under more favourable circumstances than in some of the Australian colonies."

Australian Amber.—A curious discovery, that of a mine of amber, has been made at Grassy Gully, near Rokewood, and some men are now at work at the mine, and others prospecting for the same mineral in the vicinity. A professional mineralogist of Ballarat thus reports on the substance found:—"The resinous substance left with me for examination is undoubtedly amber, and has not previously, to my knowledge, been found in this colony, making, therefore, another addition to our colonial minerals. The colour of the said substance is brown, streaked yellowish white, transparent, conchoidal fracture, lustre waxy. Specific gravity, 1.1. Acquires resinous electricity by friction; contains empyreumatic oil and succinic acid, and corresponds in all other respects with the brown amber of Europe."

Obituary.

M. Rayer, member of the Institut of France, formerly Dean of the School of Medicine of Paris, and president of the Central Committee of Public Salubrity, died recently at the age of 74. M. Rayer was author of a treatise on diseases of the skin, and on the urinary secretions; and founder of the Société de Biologie.

Notes.

Convention between France and Portugal.—An Imperial decree of the French Government promulgates the conditions of a convention make with Portugal for the mutual protection of the productions of intellect and art. The terms are the same as those adopted in the conventions made with other countries, placing the authors and artists of both nations on perfect equality.

Completion of the Road System in France.—A series of very important documents appeared in the

Moniteur, a short time since, relative to the completion of the various lines of road, and the improvement of the rivers and canals of the empire. They consist of reports of ministers and an Imperial decree for the completion of the works commenced in 1861. The first object in view is, by the creation of a special fund on long annuities, to complete the proposed system of local roads in a period of about ten years. The municipal councils were directed to meet in the beginning of September, each in its own commune, and revise and classify the roads proposed to be executed. They are to be classed in three categories, according to their importance and consequent urgency. The revised lists of the councils are then to be open to the public for ten days, with a view to collect the opinions of the populations; and at the end of the same month the members of the same councils, as well as of those of the various arrondissements, and the maires of the communes, are to meet in each canton, and revise the work of the several municipal councils. Estimates are then to be drawn up for the execution of the first and second categories, and, finally, a commission elected from the councils of departments is to meet in the early part of November and report on the classification, the time proposed for the execution of the works, and on the ways and means, and the prefects are to report the result to the Minister of the Interior, to whom the execution of the decree is entrusted. The total amount of the rough estimate, as given in the ministerial report, is 800,000,000 francs (£32,000,000), distributed over ten years; of this sum 500 millions is for the cost of construction, and the remaining 300 millions for maintenance. The expenditure for the same purposes at the present time is equal to rather more than half the gross amount given above. The difference is proposed to be supplied in the following manner:—One half by the communes themselves, one quarter by the departments, and the remaining quarter by the state. The special funds are to be raised under a guarantee from the government, on thirty year annuities, at 4 per cent. interest.

Supply of Water for Paris.—Another immense reservoir, similar to that which some of the members of the Society of Arts visited a short time since at Menilmontant, is about to be constructed on an eminence at Montrouge, near the Barrière Saint Jacques, to receive the waters of the valley of the Vanne, the subject being announced for adjudication on the 25th Sept. at the Hôtel de Ville. It is estimated that the valley of the Vanne, which is rich in springs emanating from the chalk beds, will furnish easily, at a maximum altitude of 70 mètres, 100,000 tons of excellent water. A third reservoir, constructed at Passy in 1858 to receive spring water, completes the triangle by means of which the houses of Paris may eventually be supplied with water as high as the fifth floors.

Shipwrecks.—The *Bureau-veritas* of Paris gives the following as the list of total losses for the month of July:—

British vessels	68
Norwegian	25
American	22
French	14
Danish	8
Prussian	8
Dutch	6
Miscellaneous	16
Total	167

Of these only ten were steamers. In addition to the above there were thirteen vessels wrecked and condemned, and fourteen others supposed to have been lost in consequence of the absence of all news respecting them. The total number of vessels lost between the 1st January and the 31st July is stated to have been 1,681, or twenty-five more than during the same period of last year.

Patents.

From Commissioners of Patents' Journal, September 13th.

Grants of Provisional Protection.

Bale fasteners, &c.—2444—M. A. Soul.
Boots and shoes—2375—J. Cronier.
Bottle and compass, combination of a—2074—G. Boehm.
Brushes—2450—W. Pedder.
Cartridges—2369—J. W. Dixon and W. Buttery.
Cotton, &c., finishing—2446—H. Hanson.
Crank motions—2379—W. E. Newton.
Fire lighters—2377—J. Hooker and F. Braby.
Furnaces—2472—R. Weare.
Greenhouses, heating—2361—J. Wavish.
Hydraulic presses—2454—W. T. Watts and D. J. Fleetwood.
Iron and steel—2438—G. Haseltine.
Iron and steel, &c.—2484—C. Gelstharp.
Locomotives—2456—R. Edwards.
Looms—2365—T. Sagar and T. Richmond.
Looms—2442—E. B. Bigelow.
Looms—2448—W. Wilson and J. Cowburn.
Manures—2462—C. Stagg.
Meters, &c., indexes to fluid—2371—W. W. Pocock.
Paints, grinding—2464—J. and R. D. Paulin.
Perfumes, diffusing—2478—W. Aubert.
Phosphorus—2458—C. D. Abel.
Reaping machines—2367—M. Frow.
Roads, watering—2482—H. O. W. and E. F. Cooper.
Rubbish, &c., from streets, removing—2434—W. Berry.
Seaweed, treatment of—2436—E. Sonstadt.
Seeds, drawing and dressing—1344—C. Burrell.
Ships' propellers—2476—J. A. Brown.
Signals—2468—A. M. and M. A. Wier.
Smoking tubes—2474—M. Hammerstein.
Spring balances—2470—J. Silvester.
Submarine exploration—2466—A. M. Clark.
Telegraphs—2480—D. Nicholl.
Textile fabrics—2460—A. Stewart.
Topsails, reefing—2440—J. W. Webb.
Vegetable substances, cutting, &c.—2373—W. R. Goulty.
Window fastenings—2486—H. Vallance.

Inventions with Complete Specifications Filed.

Paddle wheels—2506—G. T. Bousfield.
Wire heddles for loom harness—2551—D. C. Brown.

Patents Sealed.

456. T. Archer.
572. R. A. Jones & J. C. Hedges.
756. T. Cowburn.
767. S. Holness.
768. T. Shedden.
774. J. Smith.
779. W. H. Parsons.
782. A. W. Moore & E. McNeal.
808. B. J. Smith.
820. W. Clark.
873. J. Hesse.
884. G. Hookham.
888. H. Sharp and F. W. Webb.
927. W. Easterbrook.
937. J. Wolverson.
946. S. M. Grover.
970. A. V. Newton.
1099. J. Aitken.
1100. K. H. Cornish.
1202. A. M. Clark.

From Commissioners of Patents' Journal, September 17th.

Patents Sealed.

785. C. F. Cooke.
787. F. Gregory.
793. J. M. Clements.
794. A. S. Cameron.
796. T. Aveling.
797. W. McAdam & S. Schuman.
799. W. Clark.
809. J. R. Swann.
810. G. Bischof.
811. G. Chambers.
812. John Leeming.
813. D. Y. Stewart.
815. J. Booth.
816. J. H. Simpson.
818. H. Clifton.
822. J. A. Limbert.
828. W. R. Lake.
832. W. W. Gibson.
834. G. Little.
836. J. Whitley.
837. J. Lawson.
839. G. Adams & W. T. Whiteman.
840. S. Sedgwick.
844. R. Duncan.
847. E. Watteeu.
850. W. J. Hanson.
853. J. G. Tongue.
855. G. T. Bousfield.
856. J. Betteley.
859. G. Davies.
861. J. H. Johnson.
862. R. Higgins.
917. G. A. Buchholz.
924. P. Shaw.
938. W. Bywater.
939. W. Gadd and L. Baillon.
1031. R. Neild, T. Smith, and J. Yates.
1044. W. R. Lake.
1346. W. R. Lake.
1734. R. H. Parton.
1800. F. G. N. Perrett.
1961. W. Day.
1967. W. R. Lake.
2092. T. Archer.

Patents on which the Stamp Duty of £50 has been Paid.

2223. H. C. Baildon.
2236. J. H. Ritchie.
2252. A. V. Newton.
2260. J. H. Simpson.
2285. E. Slaughter and F. L. F. Caillet.
2314. H. Bridgewater.
2547. J. Hayes.

Patents on which the Stamp Duty of £100 has been Paid.

2225. J. Petrie.
2247. J. M. Napier.
2261. W. E. Newton.
2287. T. Briggs.
2335. W. Hargreaves.

Journal of the Society of Arts.

FRIDAY, SEPTEMBER 27, 1867.

Announcements by the Council.

ARTIZANS' VISITS TO PARIS.

Her Majesty's Government have transmitted to the Society of Arts, in aid of the fund raised by the Society for assisting workmen, specially selected from various trades, to visit and report on the Paris Exhibition, the sum of £500, which was granted conditionally on the Society raising a like amount by public subscription.

The amount received up to the present time is as follows :—

H.R.H. THE PRINCE OF WALES, President	£31 10 0	
Society of Arts	105 0 0	£518 14 0
Other Subscriptions	382 4 0	
HER MAJESTY'S GOVERNMENT..	500 0 0	
Total	£1,018 14 0	

Subscriptions may be forwarded to the Financial Officer, at the Society's House.

The following workmen have been selected :—

NAME.	TRADE.
Connolly, Thomas	Mason.
Lucraft, B.	Chairs and sofas.
Whiteing, Geo	Grainer and decorator.
Kay, Alexr.....	Joiner.
McEwen, J.....	Mason.
Forbes, G. B.	,,
Whiteing, Richd.	(Special reporter.)
Green, Aaron	Decorator.
Beardmore, Wm.	Potter.
Hooper, C. A.	Cabinet maker.
Blunt, Walter.....	Leather worker.
Walker, Wm.	Woodworking machinery.
Wilkie, Thos.	,, ,,
Booth, Laurence.....	Ribbon weaving.
Gutteridge, Joseph....	,,
Gregory, John.....	Watch trade.
Stringer, James	,,
Stanton, George	Horticulturist.
Bird, Joseph	Lace trade.
Dexter, George	,,
Smith, Edward	,,
Kendall, George.....	Hosiery trade.
Caunt, Geo.....	,,
Wilson, John	Cutlery.
Bramhall, Wm.	Saw maker.
Cooper, Samuel	Floor and wall tiles and pavements.
Coningsby, R.....	(Special reporter.)
Evans, J.....	Engineer.
Rosmüssen, P. A.	Silversmith.
Sinclair, R.	Tailor.
Bourne, W.....	Foreman, india-rubber works.
Letheren, W.	Art metal workman.
Winstanley, T. W.....	Architectural metal worker
Prior, J. D.....	Carpenter.
Mondy, E. F.	Shipwright.
Jeffery, J.....	Bricklayer.
Hughes, J. W.	Joiner.
Elliott, W.	Die-sinker.
Howell, G.	Bricklayer.
Bentley, J.	Ivory carver.
Berry, G.	Engraver.
Barrett, R.	Silver chaser.
Kirchoff, F.....	Glass painter.
Jacob, T.	Cabinet draughtsman.
Page, G.	Silversmith.
Mackie, J.	Wood carver.
Baker, R.....	,,
Genth, L.....	Bookbinder.
Randall, J.	China painter.
Oats, Francis	Mining.
Jung, H.	Watchmaker.
Bartlett, Charles.....	Plasterer.
Learmouth, W.	Engineer.
Boast, James	Shawl weaver.
Appleton, John	,,
SENT FROM BIRMINGHAM.	
Taylor, J.....	Gas-fitting, chandeliers, and lamps.
Bayley, Thomas	Plumbers' brass foundry.
Gorman, William	Cabinet ,, &c.
Dry, Henry.....	General ,,
Fowler, Henry	Labour-saving machines.
Clay, John	Saddles and bridles.
Thompson, Frederick..	Harness and leather work.
Plampin, James	Jewellery and gilt toys.
Johnson, Thomas	Buttons.
Bridges, Wm.....	Buttons, metal caps, tools, and metal ornaments.
Hibbs, Charles.....	Guns, &c.
Sargeant, David	Papier-maché, &c.
Archer, Thomas	Japanning.
Guise, Wm.....	Needles and fish-hooks.
Pearsall, Richd.	Glass for glazing purposes, plate-glass, &c.
Swene, W. S.	,, (fancy.)
Wilkinson, T. J.	,, (practical manipulation.)
Moore, Chas. W.	Die-sinking.
Poole, Edwin	Tinplate working.
Whitehouse, Benj.	Railway-carriage building.
Jackson, F.	General ornament.
Deeley, W. J.	Jewellery, with diamonds and precious stones.
Fellows, Henry	Electro-plate and plated wares.
Petit, J. L.	Steel pens.
Ansell, James	Church and other bells.
Fisher, John	Gas and other tubes.
Dodd, J.	Chandeliers and gas-fittings.

Proceedings of the Society.

MEMORIAL TABLETS OF GREAT MEN AND EVENTS.

Tablets to the memory of illustrious men have now been placed in the following situations in London :—

Lord Byron.—24, Holles-street, Cavendish-square.
Napoleon III.—3A, King-street, St. James's.

Whilst the Council intend proceeding with this work, they desire also to see it carried on by others—either by corporate bodies or individuals—and the Council will be happy to be instrumental in procuring suitable tablets from the manufacturers. It is hardly necessary to repeat how greatly the interest of the metropolis would be increased thereby.

In order to show how rich the metropolis is

in the memory of important personages and events, which it would be desirable to mark by means of tablets on houses, the Council have caused an alphabetical list to be prepared, the second part of which is now inserted. Other parts will follow. The Council request the assistance of members of the Society in completing and correcting this list, especially with reference to dates and the insertion of other names.

Castlereagh, Lord (b. 1769—d. 1822); he originated the idea of starting the Travellers' Club; lived in St. James's-square, in the large house north corner of King-street; buried in Westminster Abbey.

Catnach, ballad printer, lived in the Seven Dials.

Cave, Edward (b. 1691—d. 1754); editor, printer, and proprietor of the *Gentleman's Magazine* (1731). He lived at St. John's-gate, Clerkenwell.

Cavendish, George, Earl of Burlington, lived in Burlington-house. He obtained a renewal of the lease when, in 1809, there was a talk of its coming down.

Cavendish, W., Duke of Newcastle, and Margaret, his Duchess, m. 1673 (b. 1592—d. 1676); lived in Clerkenwell, and, at the time of the Restoration, at Dorset-house, Fleet-street.

Caxton, William, the father of English printing, set up the first printing press in the Almonry, Westminster; lived in a house on the north side of the Almonry, called "The Reed Pale;" buried and monument to him in St. Margaret's, Westminster.

Cecil, Sir Robert, Earl of Salisbury (b. 1550—d. 1612); lived in Beaufort-house, Chelsea; also in Salisbury-house, Strand, which stood on the sites of Cecil-street and Salisbury-street.

Cecil, Thos., Earl of Exeter (d. 1622); lived at Exeter-house, now the site of Burleigh-street, Strand. He is buried at Westminster Abbey.

Centlivre, Susannah (b. 1680—d. 1723); authoress of the "Busy Body" and the "Wonder;" died in Buckingham-court; buried in St. Paul's, Covent-garden.

Chamberlain, Dr. Hugh (b. 1664—d. 1728); one of the early inhabitants of Essex-street.

Chambers, Sir Wm. (b. 1726—d. 1796), architect; designed the Albany and the present building of Somerset-house; lived in Berners-street, Oxford-street.

Chantrey, Sir Francis, R.A. (b. 1782—d. 1841), sculptor, and one of the founders of the Athenæum Club; lived in an attic in No. 24, Curzon-street, May-fair; also in No. —, Eccleston-street, from 1814 until his death.

Chapman, George (b. 1557—d. 1634), translator of Homer, buried in St. Giles-in-the-Fields.

Charles V. of Spain (b. 1500—d. 1558) lodged in Blackfriars when on a visit to Henry VIII. His retinue were lodged in various parts, some in Bridewell-house, and others in St. Lawrence-lane.

Charles X. of France (b. 1757—d. 1836); lived in No. 72, South Audley-street, Grosvenor-square, now Mr. Hankey's.

Chatelaine, J. B. (circ. 1760—d. 1774), engraver; died in White Bear Inn, Piccadilly.

Chatterton, Thos. (b. 1752—d. 1770), poet; lived and died at a Mrs. Angel's house, in Brooke-street, Holborn. Buried on the site of Farringdon Market.

Chesterfield, Catherine, Countess of (d. 1677); lived in New-street, Covent Garden, on the south side, in 1660.

Chesterfield, Philip, Earl of (d. 1713); lived in Bedford-street, Strand; also in outer Spring-gardens from 1667 to 1670. He died in Bloomsbury-square.

Chesterfield, Philip, Earl of (b. 1694—d. 1773); spent a great part of his time at White's Club-house; lived and died in Chesterfield-house, South Audley-street.

Chichley, John, Chamberlain of London; lived in Baker's-hall, Harp-lane.

Christian IV., King of Denmark (d. 1648); lodged in Somerset-house when on a visit to his daughter, Anne of Denmark.

Cibber, Colley (b. 1671—d. 1757), Poet-Laureate; born in Southampton-street, facing Southampton-house; lived in Islington; said to have died in a house next the Castle Tavern. Also lived in Spring-gardens from 1711 to 1714.

Cibber, Susannah Maria (b. 1714—1766); lived at the centre house in Golden-square. Buried in Westminster Abbey.

Clare, John, Earl of (d. 1711), was living in Warwick-house in 1688.

Clarke, Dr. Samuel (b. 1675—d. 1729); author of the "Attributes of the Deity," Minister of St. Bennet, Paul's Wharf; also Rector of St. James', Piccadilly. Lived and died in the dark red brick rectory at the north side of St. James', Piccadilly.

Cleland, William, Pope's friend, lived in St. James's-place, St. James's-street.

Cleveland, Barbara, Duchess of, (d. 1709), lived in Arlington-street, Piccadilly, 1691 to 1694, also in Berkshire-house or Cleveland-house, St. James's. Baptised at St. Margaret's, Westminster.

Clifford, Lady Anne, (Ann Pembroke, Dorset, and Montgomery), (b. 1789-90—d. 1676), married the Earl of Dorset in her mother's chambers, in Austin Friars House; lived in Baynard's Castle, on the Thames.

Clifford, Thomas Lord (the Lord Treasurer), (b. 1630—1673), lived in Charles-street, St. James's-square, also in Wallingford-house, which stood on the site of the present Admiralty.

Clive, Kitty, the actress (b. 1711—d. 1785), lived in Henrietta-street, Covent-garden, where she advertised her benefit in 1756.

Clive, Robert, Lord, Governor-General of India (b. 1725—d. 1774); educated at Merchant Taylor's; committed suicide at 45, Berkeley-square.

Closterman, John, painter (b. 1656—d. 1710), lived in what is now Richardson's Hotel, Piccadilly.

Cobbett, William (b. 1762—d. 1835), lived in Bolton-street; here he published his "Register."

Cobden, Richard, M.P., instituted the Free Trade Club, 14, St. James's-square.

Cobham, Richard Temple, Lord, Pope's friend (d. 1749), lived in Hanover-square.

Cocker, Edward (ob. circ., 1677), the arithmetician, whose name passed into the expression, "according to Cocker," lived on the south side of St. Paul's Church, over against Paul's-chain; here, in 1760, he wrote "The Pen's Transcendancy;" buried in St. George-the-Martyr.

Colbert, Jean Baptiste (b. 1619—d. 1688), the French Ambassador in the time of Charles II., lived in Leicester-house.

Coke, Sir Edward (b. 1551-2—d. 1633), the last Lord Chief Justice of England, member of the Inner Temple.

Coleridge, Samuel Taylor, poet, (b. 1772—d. 1834); educated at Christ's Hospital; retreated, in one of his moody fits of melancholy abstraction to 17, Newgate-street; also lived, during his last years, at the Royal Society of Literature, 4, St. Martin's-place, Charing-cross.

Colet, John, Dr. (b. 1406—d. 1519), founder of St. Paul's School; vicar of Stepney.

Collins, Arthur (b. 1682—d. 1760), compiler of the "Peerage," lived at the "Black Boy," in Fleet-street; here, in 1709, he published the first volume of his "Peerage."

Collins, Wm., R.A. (b. 1788—d. 1844), artist; painted sea-side pieces; lived and died at No. 1, Devonport-street, Hyde-park-gardens.

Colman, George, the Elder (b. 1733—d. 1794), actor; bought the licence of the Haymarket theatre, of Foote, in 1777; lived in the left-hand corner of Bateman's buildings.

Colman, George, the Younger (b. 1762—d. 1836), actor; lived and died at No. 22, Brompton-square.

Compton, Henry, Bishop of London (b. 1632—1713); lived in London-house; Aldersgate-street.

Congreve, Wm. (b. 1672—d. 1729), dramatist and poet; a templar; was living in Surrey-street when visited by Voltaire; died here; buried in Westminster Abbey.

Constable, John, R.A. (b. 1776—d. 1837), artist; lived at 35, Charlotte-street, Rathbone-place, from 1822 till his death, in 1837.

Conway, Henry S. (b. 1720—d. 1795); Field-Marshal, and Walpole's correspondent; lived in the right-hand corner house leading from Greek-street, on the south side of Soho-square.

Cooper, Sir Astley (b. 1768—d. 1841), surgeon; lived at No. 2, New-street, Spring-gardens; he was buried in the chapel of Guy's Hospital, Southwark; there is a monument to him in St. Paul's Cathedral.

Cooper, Samuel (b. 1609—d. 1672), miniature painter; lived on the south side of Henrietta-street, Covent-garden; a monument is erected to him in the church of St. Pancras-in-the-Fields.

Copley, John, S. (b. 1737 — d. 1815), the American painter; lived at 25, George-street, Hanover-square.

Cornwallis, Lady (time of Charles II.); lived in Newport-street, Long-acre.

Coryat, Tom. (d. 1617), the celebrated traveller; lived in Bow-lane, Cheapside.

Cosway, Richard, R.A. (b. 1740—d. 1821), artist; obtained the first prize for drawing of the Society of Arts; he lived at Schomberg-house, Pall-mall, and a tablet is erected to his memory at St. Marylebone New Church.

Cotes, Francis, R.A. (b. 1726—d. 1770), artist; lived and died in 32, Cavendish-square.

Collingham, Sir Francis, afterwards Lord (b. 1574—d. 1651); lived at Wallingford-house, which stood on the site of the present Admiralty, and was an official residence at an early period; he was granted the manor of Kennington; a monument is erected to his memory in Westminster Abbey.

Cotton, Charles (b. 1630—d. 1687), the friend and companion of Isaak Walton; is buried in St. James's Church, Camberwell.

Cotton, Sir Robert (b. 1570—d. 1631); the founder of the famous Cotton Library; lived at Cotton-house, Westminster. A portrait of him hangs in the British Museum, suspended on the walls of the Eastern Zoological Gallery.

Coventry, Thomas, Lord (d. 1640) Lord Keeper; lived and died in Durham-house, Strand.

Coventry, William, Earl of (d. 1750), lived in Hanover-square.

Coventry, Henry (b. 1618—d. 1686), secretary to Charles II., lived in Coventry-house, which stood on the site of Coventry-street, Haymarket. He is buried in St. Martin's-in-the-Fields, where a monument is erected to his memory.

Coventry, Sir John. At the corner of Suffolk-street, Haymarket, this gentleman had his nose cut to the bone for some remarks he had made in the House of Commons. This led to the passing of the famous "Coventry Act" against cutting and maiming the person.

Coverley, Sir Roger de, lived in Bow-street, also in Norfolk-street, but chiefly in Soho-square.

Cowley, Abraham (b. 1618—d. 1667), the poet, patronised by the Earl of St. Alban's, was born in Fleet-street, London, near Chancery-lane, educated at Westminster School, and while a scholar here he published a volume of poems. His portrait hangs in the Privy Gardens collection. He lay in state at Wallingford-house, the residence of the Duke of Buckingham, and was buried in Westminster Abbey, where a monument is erected to his memory.

Cowley, Hannah (b. 1743—d. 1809), authoress of "The Belle's Stratagem," which she wrote in Corporation-row, Islington-spa.

Cowley, Richard (d. 1618), actor, and one of the original performers in Shakespeare's plays. Buried in St. Leonard's, Shoreditch.

Cowper, William, Earl (b. 1670—d. 1723), Lord Chancellor. He lived at 13, on the west side of George-street, Hanover-square.

Cowper, Sir William, Bart. (d. 1664), lived in the neighbourhood of Cowper-court, Cornhill, where he owned large property. He built Portugal-row, Lincoln's-inn-fields.

Cowper, William (b. 1731—d. 1800), the poet, was educated at Westminster School. The quay fronting the Thames by the Custom-house was the place where he intended drowning himself during his insanity, but gave up his idea as the water was low. In the churchyard of St. Margaret's, Westminster, when a schoolboy, he met with an adventure which greatly affected his mind. One dark evening he saw a light in the churchyard, and going up to it found the sexton digging a grave. As Cowper approached he was struck on the leg by a skull which the old man had just turned up and was throwing out.

Crabbe, Rev. George (1754 to 1832), poet, lived at 37, Bury-street, St. James's. In Charles-street, St. James's-square, he was introduced to and obtained the patronage of Burke.

Craggs, James (d. 1770), Secretary of State, and friend of Pope and Addison, &c. He lived at St. James's-place, St. James's-square; he died in Jermyn-street, St. James's, and was buried in Westminster Abbey, where a monument is erected to his memory.

Craven, William, Earl of, (1608 to 1697), founder of Pesthouse-field, in use during the plague; he lived in Berkshire-house, St. James's; also in Craven-house, Drury-lane. A portrait of him hangs in the Charterhouse.

Cremorne, Lord, lived in Chelsea.

Crew, Lord, Bishop of Durham (1633 to 1721), lived in the Piazza, Covent-garden.

Crispin, Dr. (about 1687); one of the earliest inhabitants of Pimlico.

Crockford, William (b. 1775—d. 1844), founded Crockford's Club, in St. James's-street; he lived in the house immediately adjoining Temple-bar.

Cromarty, George Mackenzie, Earl of (b. 1710—d. 1744), lived and died in Poland-street, Oxford-street.

Cromwell, Elizabeth (b. 1651—d. 1731), daughter of the Protector, Richard Cromwell, died, in her 82nd year, in her house in Bedford-row, Bloomsbury.

Cromwell, Oliver (b. 1599—d. 1651), commenced his career as a law student at Lincoln's-inn; was married to Elizabeth Bowchier, at St. Giles's, Cripplegate, 1620; frequented, with several of his party, the Star Tavern, in Coleman-street; upset a coach and six in Hyde-park, and was nearly killed. He lived at the Cockpit, Whitehall, 1649-50, at King-street, Westminster, and in Long-acre. An autograph letter, written on the field of Naseby, together with his portrait, are in the British Museum, and his sword is preserved in the United Service Institution.

Cromwell, Thomas, Earl of Essex (d. 1450); lived in Throgmorton-street, City, on the site of the Draper's Hall, and gardens.

Cruden, Alexander (b. 1701—d. 1770), author of the "Concordance," lived in the Savoy, in the Strand, also in Camden-passage, Camden-street, where he died.

Cumberland, Henry Frederick, Duke of (b. 1744—d. 1790), lived at the Ordnance-office, Pall-mall.

Cumberland, William Augustus, Duke of (b. 1721—d. 1765), hero of Culloden, born in Leicester-house, lived in Pall-mall, and lived and died in Upper Grosvenor-street.

Cumberland, Richard (b. 1732—d. 1811), dramatist, educated at Westminster School; lived in Queen Anne-street East, Cavendish-square, now Foley-place; here he wrote his best play, "The West Indian." He died at the house of Mr. Henry Fry, in Bedford-place.

Cunningham, Allan (b. 1784—d. 1842), poet; author of "The Lives of British Painters, Sculptors, and Architects;" lived and died in 27, Lower Belgrave-place.

Curll, Edmund (d. 1748), bookseller; lived in Bow-street, next door to Will's Coffee-house; also in Fleet-street, at "the Dial and Bible, against St. Dunstan's Church;" also in Rose-street, Covent-garden. He published here "Pope's Literary Correspondence." Pilloried at Charing-cross.

Curran, J. Philpot (b. 1750—d. 1817); lived and died at No. 7, Amelia-place, now Pelham-crescent, Brompton.

Curzon, Lady Diana (circ. 1668); lived in Portugal-row, Lincoln's-inn.

Daffy, Mrs. (d. 1732), elixir maker; lived and died in Salisbury-court, Fleet-street.

Damer, Honourable Anne Seymour (b. 1748—d. 1828), the sculptor; lived in No. 18, Upper Brook-street, Grosvenor-square. A statue of her, by Caracchi, is in the British Museum.

Danby, Thos. Osborne, Earl of (b. 1632—d. 1712), Lord Treasurer; one of the chief institutors of Magdalen Hospital; lived at Wallingford-house, which stood on the site of the present Admiralty.

Dance, Sir Nathaniel (b. 1730—d. 1811), artist; lived at 13, Tavistock-row, Covent-garden.

Daniel, Samuel (b. 1562—d. 1619), poet; lived in a garden house in Old-street, St. Luke's, near the Charter-house.

Dartmouth, Wm. Legge, Earl of (d. 1750), annotator of Burnet; lived in Queen's-square, Westminster. A portrait of him, by Sir Joshua Reynolds, hangs in the collection of the Foundling Hospital.

Davenant, Sir Wm. (b. 1605—d. 1668) actor. At Rutland-house the drama revived under Sir William Davenant, Cromwell, by the interposition of Whitelocke consenting to the performance of declamation and music after the manner of the ancients. Sir William Davenant lived in Axe-yard, King-street, Westminster. Was imprisoned in the Tower of London. Was buried in Westminster Abbey, where his grave has this short inscription, "O rare Sir Wm. Davenant."

Davies, John (d. 1617), poet and writing master; lived in the Middle Temple. Divided his leisure time there between composing a poem on the "Immortality of the Soul," and one on "Dancing." He was buried at St. Dunstan's in the West, Fleet-street.

Davies, Thomas (d. 1785), bookseller and actor; lived in Russell-street, Covent-garden, on the side "over against Tom's Coffee-house," now the Caledonian Coffee-house. Buried in St. Paul's, Covent-garden.

Davy, Sir Humphrey (b. 1778—d. 1829), inventor of the safety lamp; one of the principal founders of the Zoological Gardens, Regent's-park. He lived, in 1820, at 28, Lower Grosvenor-street, Grosvenor-square, when he became President of the Royal Society. A portrait of him, by Sir T. Lawrence, hangs at the Royal Society, Somerset-house.

Dawes, Sir William (b. 1671—d. 1724), Archbishop of York, lived at 24, Cecil-street, Strand. Educated at Merchant Taylors' School.

Day, John (b. 1522—d. 1584), printer of Queen Elizabeth's time, "dwelt over Alder-gate."

Decrecty, John, Serjeant-painter to James I. and Charles I., lived in Shoe-lane, Fleet-street.

De Foe, Daniel (b. 1661—d. 1731), author of "Robinson Crusoe," carried on the business of a hose factor in Freeman's-yard, Cornhill. He was imprisoned in Newgate, where he commenced his "Review;" he was buried in Bunhill-fields burial-ground.

Denham, Lt.-Col. Dixon, (b. 1788—d. 1828), the African traveller. He was educated at Merchant Taylors' School.

Denham, Sir John (b. 1615—d. 1688), architect and surveyor to the Crown, but best known by his poem of "Cooper's-hill." Built Burlington-house, Piccadilly. He was a student at Lincoln's-inn, and lived in Scotland-yard, Whitehall. Lies buried in Westminster Abbey.

Denison, Mr. J. (d. 1806), lived and died at 16, St. Mary-axe, a street and parish in Lime-street Ward.

Dent, Mr., the book collector, lived and had his fine library at 10, Hertford-street, Mayfair.

Devereux, Robert, Earl of Essex (b. 1567—d. 1601). He lived in Essex-house, Strand. He was under surveillance in York-house for six months, in charge of Lord Keeper Egerton, and was confined in Lambeth-palace. His character was blackened by command in a Sunday's sermon at Paul's-cross. He was beheaded under the walls of the Tower of London, and buried in the church of St. Peter's ad Vincula.

Devonshire, Wm. Cavendish, Earl of (d. 1628), lived and died in his house near Bishopsgate, buried in St. Botolph-without, Bishopsgate.

Devonshire, Wm. Cavendish, Earl of (d. 1654), lived in "Little Salisbury-house," died in Newport-house, Long-acre, described as "neere Leicester-fields, in the suburbs of London."

Devonshire, Wm. Cavendish, first Duke of (d. 1707), one of the heroes of the revolution of 1688. He lived in Salisbury-house, Strand, and afterwards in Newport-street, then in Montague-house, Bloomsbury, then in Arlington-house, St. James's-park. He died in Berkeley-house, which stood on the site of the present Devonshire-house, Piccadilly. Before Berkeley-house was built, Hay-hill Farm stood here. He was a member of the Kit-Kat Club, which first met in Shire-lane.

D'Ewes, Sir Symonds (b. 1602—d. 1650), the journalist, lived in Dean's-yard, Westminster, and in Fleet-street.

Dibdin, Charles (b. 1745—d. 1814), song writer, lived and died in Arlington-street, Camden-town; he lies buried in the Churchyard of St. Martin's-in-the-Fields, where a monument is erected to his memory.

Digby, George, Earl of Bristol (b. 1609—d. 1672-3), lived in Beaufort-house, Chelsea, also in Queen's-street, Lincoln's-inn-fields; this latter house was granted, by an ordinance of Parliament, dated 13th September, 1644, to Lady Brooke, wife of the fanatical Robert Lord Brooke.

Digby, Sir Kenelm (b. 1603—d. 1665), lived in Holborn, between King-street and Southampton-street; also in St. Martin's-lane; also in a house on the site of Evans's Hotel, in the Piazza, Covent-garden, where he probably died.

Dilly, Edward, bookseller and publisher, lived at 22, Poultry. Here Dr. Johnson met Jack Wilkes at dinner, and here Boswell's "Life of Johnson" was first published. He is buried at St. George the Martyr, Queen-square, Bloomsbury.

Disraeli, Isaac (b. 1766—d. 1848), lived at No. 6, west side of Bloomsbury-square, the first house from Hart-street. Here he compiled his "Curiosities of Literature."

Dives, Sir Lewis (circ. 1637), lived on the south side of Henrietta-street, Covent-garden, in 1637.

Dominique, Paul, lived in a large, plain, brick built house next the chapel, on the east side of St. Martin's-street, Leicester-square.

Dodington, George Bubb, Lord Melcombe (b. 1691—d. 1762), the Bubo of Pope, lived in Pall-mall; he was a member of White's Clubhouse.

Dodsley, Robert (b. 1703—d. 1764), bookseller, originally a footman, lived in Pall-mall; he opened a shop here in 1735, with the sign of Tully's Head, and was buried at Durham.

Dolben, Bishop of Bangor (d. 1633), lived in Bangor House, Shoe-lane, now Bentley's printing offices; he was the last Bishop of Bangor who resided there.

Donne, Dr. John, poet (b. 1573—d. 1631), originally a student at Lincoln's Inn. He was vicar of St. Dunstan's-in-the-West, Fleet-street, and was imprisoned in the Fleet Prison for marrying Sir George More's daughter without her father's knowledge. He was buried, and a monument stood to his memory, in old St. Paul's Cathedral.

Dorchester, Henry Pierrepoint, Marquis of, lived in Peter-house, Aldersgate-street, which stood nearly opposite Shaftesbury-house. It was converted into a prison by Cromwell, and subsequently bought by the see of London, after the Great Fire, for the episcopal residence.

Dorset, Cicely Baker, Dowager Countess of (d. 1615), lived and died in Great Dorset-house, Fleet-street, no longer standing; imprisoned in the Fleet "for pressing into the privy chamber, and importuning the King, contrary to commandment."

Douce, Francis (b. 1757—d. 1834), the antiquary, lived and died at 15, Upper Gower-street, Bedford-square; also at 34, Tavistock-place, Tavistock-square.

Doughty, William (circ. 1760—d. 1780), engraver of mezzotint portraits, after Sir Joshua Reynolds; lived at No. 4, Little Tichfield-street, Cavendish-square, in 1779.

Douer, Lord (temp. Charles I.); lived in Old Broad-street, Austin-friars.

Drayton, Michael (b. 1563—d. 1631), poet; lived "at the Baywindowe-house, next the east end of St. Dunstan's Church, in Fleet-street." A portrait of him hangs in Dulwich College. Buried, and a monument erected to him, in Westminster Abbey.

Drury, Sir William (d. 1589); built and inhabited Drury-house, Drury-lane; the Olympic Theatre now occupies the site.

Dryden, Erasmus, the poet's brother (circ. 1690), was a grocer in King-street, Westminster. He belonged to the Grocers' Company, and is described in the Grocers' books as one "who for many years has used the mistery of grocerie."

Dryden, John (b. 1631—d. 1700), poet, educated at Westminster School. He is said to have lived at 16, Fetter-lane, Holborn, but this is doubtful. He was married, on the 1st December, 1663, to Lady Elizabeth Howard, in the old church of St. Swithin's, by London-stone. From 1682 to 1686 he lived in a house on the north side of Long-acre, facing Rose-street, and he is styled in the rate-book John Dryden, Esquire (an unusual distinction in those days), the sum he paid to the poor varying from 18s. to £1. It was in the latter street that he was barbarously assaulted by three men hired for the purpose by Wilmot, Earl of Rochester. He also lived in Salisbury-court, Fleet-street, now called Salisbury-square, and in Gerard-street, Soho, in the house now numbered 43, where he died, in May, 1700. His body lay in state in the College of Surgeons, and was buried in Westminster Abbey, where a monument is erected to his memory.

Dudley, John William, Earl of (b. 1781—d. 1833); lived at No. 16, Arlington-street, Piccadilly.

Dudley, John, Earl of Warwick and Duke of Northumberland (b. 1502—d. 1553); lived in Ely-place, at which house the council met which formed that remarkable conspiracy which ended in the execution of the Protector Somerset.

Dugdale, Sir William (b. 1605—d. 1685-6), the antiquary and Garter King-at-Arms. The apartments of Garter King-at-Arms, at the north-east corner of the Herald's College, Doctor's-commons, were built at his expense in the reign of Charles II.

Duncombe, Sir John; lived in Charles-street, St. James's-square, one of its earliest inhabitants.

Dunmore, Lord (temp. George I.), one of the first inhabitants of Hanover-square.

Dunton, John (b. 1659—d. 1733), bookseller, author of that amusing publication, "His Life and Errors," lived, in the reign of William III., at the sign of the Raven, in Jewin-street, at the corner of Bull Head-court, Aldersgate-street. Here he published his "Athenian Mercury." He lies buried in Bunhill-fields burial ground.

D'Urfey, Tom (d. 1723). At No. 70, Queen's-Arm's-Tavern, Newgate-street, at a convivial meeting, he obtained the suggestion of his well known publication entitled, "Pills to Purge Melancholy." He lies buried in St. James's, Clerkenwell.

Dyer, Sir Edward (d. 1607), poet; lived in Winchester-house.

Proceedings of Institutions.

YORKSHIRE UNION OF MECHANICS' INSTITUTES.—The Council of the Union, in conjunction with the managers of the Yorkshire Penny Savings Bank, have organised a popular entertainment for the towns and villages of the county, in order to render the prevalent taste for amusement a means of imparting some useful knowledge. A thoroughly-qualified person has been engaged to give the entertainment, which will be illustrated by dissolving views, illuminated by the oxy-hydrogen light. The mechanical arrangements are most complete. Through the kindness of Lieut.-Colonel Akroyd, M.P., and Mr. Titus Salt, who have undertaken to contribute, if necessary, fifty pounds each, coupled with liberal donations from Earl de Grey, Sir F. Crossley, Bart., M.P., and other gentlemen, the entertainment will be given at almost a nominal charge.

EXAMINATION PAPERS, 1867.

The following are the Examination papers set in the various subjects at the Final Examination held in April last:—

(*Continued from page* 674.)

SPANISH.

THREE HOURS ALLOWED.

Candidates for a first-class certificate will have to translate an English passage into Spanish, to render in English or French several idiomatic phrases, and to write in Spanish a short essay.

Translate into Spanish:—

Morning scarcely had dawned through the balconies of the east, when five of the six goatherds got up and went to awake Don Quixote, whom they asked whether he continued in his resolution of going to see the famous interment of Chrysostom, for, if so, they would bear him company. Don Quixote, who desired nothing more, arose, and ordered Sancho to saddle and pannel immediately, which he did with great expedition; and with the same dispatch they all set out on their journey. They had not gone a quarter of a league, when, upon crossing a pathway, they saw six shepherds advancing towards them, clad in jackets of black sheep-skin, with garlands of cypress and bitter rosemary on their heads, each of them having in his hand a thick holly-club. There came also with them two gentlemen on horseback, well-equipped for travelling, who were attended by three lacqueys on foot. When the two parties met they courteously saluted each other, and finding upon inquiry that all were proceeding to the place of burial, they continued their journey together. One of the horsemen, addressing his companion, said, "I think, Signor Vivaldo, we shall not repent having stayed to see this famous interment; for, without doubt, it will be an extraordinary sight, according to the strange accounts these shepherds have given us of the deceased shepherd and murdering shepherdess." "I think so too," answered Vivaldo, "and, so far from regretting the delay of one day, I would stay four to see it." Don Quixote asked them what they had heard of Marcela and Chrysostom? The travellers said

they had met those shepherds early in the morning, and that, observing their mournful apparel, they had inquired the cause, and were informed of it by one of them, who told them of the beauty and singularity of a certain shepherdess, called Marcela, and the loves of many that wooed her, with the death of Chrysostom, to whose burial they were going. In fine, he related all that Pedro had told Don Quixote.

Don Quixote, translated by Jarvis.

Point out the irregularities of three verbs contained in the preceding paragraph.

Translate into English:—

Un caballerito que iba á casarse, despues de confesado, entró en escrupulo, y se volvió á confesar; Padre, le dijo, no sé, si me he confesado bien, pues veo que no me habeis impuesto ninguno penitencia. El confesor que era entendido, le respondió. ¿Pues no me habeis dicho, hijo, que os vais á casar?

Un bufon preguntó á uno que tenia las piernas torcidas, y la cadera derecha derrengada, que camino habeis tomado para ir á Cadiz? He venido todo derecho respondió. Pues, senor, en ese caso, os habeis furiosamente transformado en el camino.

Idiomatical Expressions.

1. Antes que te cases, mira lo que haces.
2. Escribe antes que des, y recibe antes que escribas.
3. Quien con lobos anda, á aullar se enseña.
4. Te amaré por los siglos de los siglos.
5. Es un caballero que tiene bien cubierto el riñon.
6. El nació de pies para ser nuestro escudero.
7. Cuando nos retiramos llovia á cantaros.
8. Mi primo y su hermano eran uña y carne.
9. Siempre me da razones de pie de banco.
10. Al presentarse á mi, se le cayó la cara de verguenza.
11. Me hizo la oferta con la boca chica.

Write a short essay on the works of Cervantes.

Candidates for a second-class certificate will have to translate the half of the preceding extract, and five of the idiomatical expressions, and to answer some grammatical questions.

1. What is remarkable in all the Spanish verbs relating to the imperative?
2. Explain the irregularities of the verbs *oir*, *saber*, *exponer*, *prevenir*.
3. When is the word *but* rendered in Spanish by the words which it represents?
4. Write a short letter in Spanish on any subject.

Candidates for the third-class certificate will have to translate into English or French the following extract from Gil Blas, and to answer some grammatical questions.

Ya no pudia mas el pobre eclesiastico, y presentandole yo un gran vaso del soberano especifico para que le bebiese. Quita alla, amigo Gil Blas, me dijo con voz desmayada, yá no puedo beber mas. Conozco que me es preciso morir á pesar de la grande virtud del agua, y que no me siento mejor, aunque apenas me ha quedado en el cuerpo una gota de sangre; prueba clara de que el medico mas habil y mas sabio del mundo no es capaz de prolongarnos un instante la vida, cuando llegó el termino fatal. Es yá necesario disponerme para partir al otro mundo. Anda, pues, y traeme aqui un escribano, que quiero hacer testamento. Cuando oi estas palabras, que ciertamente no me desagradáron, fingí entristecerme muchisimo, y disimulando la gana que tenia de ejecutar, cuanto antes, el encargo que me acababa de dar, como hace en tales casos todo heredero: Oh, señor, le respondi, dando un profundo suspiro, no está su merced tan malo, por la misericordia de Dios, que todavia no pueda esperar levantarse. No, no, hijo, repuso; esto yá se acabó. Estoy viendo que sube la gota, y que la muerte se va acercando; vé, pues, y haz cuanto antes lo que te he mandado. Conoci efectivamente que se le mudaba el color, y que iba perdiendo terreno por instantes; por lo que, persuadido que el asunto estrechaba, marché volando á ejecutar lo que me habia ordenado, dejando con el enfermo á la señora Jacinta, la cual temia aún mas que yo que nuestro canonigo se nos muriese sin testar. Entréme en casa del primer escribano que encontré: Señor, le dije, mi amo el licenciado Cedillo está acabando; quiere hacer su ultima disposicion, y no hay que perder tiempo. Que medico le asiste? me preguntó. El Doctor Sangrado le respondi. Pues vamos, vamos apriesa, repúso él, cojiendo apresuradamente la capa y el sombrero, porque ese Doctor es tan espeditivo, que no da lugar á los enfermos para llamar el escribano. Es un hombre que me ha hecho perder muchos testamentos.—*Gil Blas*, lib. 2, cap. 11.

Grammar.

1. Are the adjectives generally prefixed to their nouns in Spanish as in English?
2. Which are the rules for prefixing the adjectives?
3. How is *that* translated into Spanish after English comparatives?
4. Write fully 400,000 *soldados*; 500 *fusiles*; *Carlos* the Fourth, the son of *Carlos* the Third.
5. How are translated into Spanish the verbs to *have* and to *be*, when they are followed by another verb in the infinitive? Give examples.
6. Explain the irregularities of the verbs *morir*, *reir*, *creier*.
7. Translate into Spanish:—The bread is blessed. God has blessed you.

FREE-HAND DRAWING.

three hours allowed.

Candidates are not required to attempt all the following subjects:—

1. Draw the dog and the arm-chair together or separate.
2. Make a drawing of a wagon-wheel in perspective from memory.
3. Make an original design, the subject being a deluge.

Answer the following questions:—

1. How many head-lengths are there in the human figure?
2. How many face-lengths in the figure?
3. What proportion is the hand to the figure?
4. What proportion is the foot to the figure?

Directions for the Local Boards.

Place a dog near a large arm-chair, for the candidates to draw from.

(To be continued.)

PARIS EXHIBITION.

The agricultural season of the exhibition is now in its prime, and competitions of all kinds are taking place. There have been two shows of grapes in the reserved garden of the exhibition, which were well deserving of more attention than they obtained. It was originally intended that the shows should apply at least as much to grapes for wine-making as for dessert, and the fruit was to be exhibited either on the vine itself or on cuttings with the leaves and tendrils uninjured. A very small portion of the exhibitors adhered to the conditions laid down, most of the grapes being exhibited in plates, some of the choice dessert fruit, such as the *blanc de Ganjah*, and the black muscat, in bunches weighing more than two pounds each, and the famous *Chasselas doré de Fontainebleau*. There are to be two more exhibitions of grapes, on the 1st and 15th of October, which are expected to be better supplied with the finer classes of wine grapes than the preceding; it is said that foreign countries will compete largely. This exhibition will also include other fruits; forty square metres have been accorded to Prussia, and Sweden is said to have asked for seventy.

An exhibition of pigs took place the other day at Billancourt, when the exhibitors were all French, and the pigs nearly all of pure or mixed English breeds. Of the ten prizes awarded, five were given to animals of

Berkshire, Yorkshire, Middlesex, and Suffolk breeds, one for crosses between New Leicester and Picardy, and Yorkshire and Craonnaise, with honourable mention for an animal of the mixed breeds of Middlesex, Berkshire, and Berrichon, and only three prizes to pigs of French breeds.

An important exhibition of horned cattle takes place next month at Billancourt, commencing on the 1st and ending on the 15th of October, including not only fat cattle but also those for breeding. It is said that the number of entries is very large, and that all the best French races will be well represented, but we hear nothing yet of contributions from other countries.

There has just been an exhibition of asses and mules at Billancourt, but the success was not great. There has also been an exhibition of dogs, when the number was large, but chiefly consisted of lap-dogs and other fancy animals. There were, however, some that presented real interest, such as the shepherd dogs of the Brie race, fine shaggy animals, that attack the wolf without hesitation, and a still larger and more powerful sheep-dog of Russian breed, a good deal like those of Brie, but with more character; this fine animal was shaved from the shoulders, with the exception of the tip of his tail, and, except his turned-up nose, looked like a lion. Several English exhibitors obtained prizes for large and small spaniels, retrievers, and other sporting dogs.

The free competition in steam and subsoil ploughing at Petit Bourg have commenced, and the operations are said to proceed in a most satisfatcory manner; no results are, however, yet published. This competition has peculiar interest, from the fact that it is an attempt to do away with the system of prizes; the subscribers to the undertaking and a jury watch all the proceedings, and full reports will be drawn up and published.

Agricultural exhibitions and competitions are being carried on in all parts of the country, so that the present is an eligible period for the visits of farmers to France.

The last attempt to maintain theatrical entertainments of any kind in the park has been given up, by the final closing of the International and Chinese theatres, nobody remaining in the grounds, or even in the restaurants and cafés, long after the dinner hour; and the experiment of making an industrial exhibition a place of evening amusement may be looked upon as most completely disposed of. Nothing could exceed the dulness of the grounds after nightfall, or their gaiety during daylight; the Eastern buildings, the model factories, in short every building and object of interest out of doors, except where an extra charge was made for admission, have been, and still are, thronged with visitors; but upon no single occasion has there been more than a mere sprinkling of people after nightfall.

It is said that the total receipts to the present time amount to about £300,000, and that a sum of £60,000 more is required to meet all demands. If this statement be correct, the Imperial Commission has little to fear, for the present average attendance, multiplied by the forty days which remain of the season would yield more than the amount, and the visitors continue to increase in number. There is talk of a grand fête to take place on the occasion of the closing of the Exhibition, but nothing of an official character has yet transpired.

BRITISH ASSOCIATION, 1867.

Iron and Steel at the Paris Exhibition.

Mr. John Fernie, of Leeds, read a paper on the iron and steel at the Paris Exhibition. He said the duty imposed on English iron entering France had prevented the English iron masters from exhibiting at Paris. Very little iron was sent from England into France; the exception was a little of the best brands from Yorkshire; and a few of the Yorkshire best makers, and one or two others, exhibited the materials they usually supplied to their French customers. The French, on the other hand, had been making considerable progress in the manufacture of iron, and no doubt prompted by a laudable desire to excel the English, had brought on the Champ de Mars an immense collection of iron work. It was not the intention of the writer to describe the whole of the collection. Most of it could be seen any day in our forges, but there were a few specimens shown which were worthy of attention. French architects had for a great many years specified for their new buildings solid rolled wrought-iron girders of all sizes, from floor joists and upwards, and a great trade had sprung up in France for this description of work, but little known in England. The largest girders of this description made in England were for our iron-plated ships, and were made as **T** irons, and welded up the centre. The girders exhibited by the Forges of Commentry were 3 ft. 7 in. deep and 12 in. on the flanges, and 12 ft. long, and would weigh about 22 cwt. The girders of Petit Gaudet and Company were 3 ft. 3 in. deep and 32 ft. long; these were larger than we had rolls for in this country. Girders should at least have a length equal to 16 times their depth. The girders of Commentry are only about three times longer than their depth, and for all practical purposes are useless. The girder of Petit Gaudet and Company is 10 times longer than its depth, but, considering the practical difficulties involved in piling, heating, and rolling, the writer contended the built-up girder of plates and angle irons was preferable. The process of stamping iron work was next discussed, and was described as a system by which a complicated forging, such as an engine wheel, was first forged in small pieces. These were then fixed together in their relative positions, then placed in a furnace and brought to a welding heat, when a few blows, in a set of dies attached to a large steam hammer, completed the process. But little had been done in this country by this system. One English house, however, exhibited samples of wheels quite equal to any exhibited by French houses. The pavilion of the Creusot Company was deserving of special mention. Plans and sections of the estate, showing the mines, the works, and then the minerals worked up into the finished engine, were shown. It had not been found profitable to conduct works of this kind in England. Here mining and iron manufacturing were often carried on together, but seldom engineering, which seemed to be a distinct branch, different branches having localised themselves in different parts of the country, away from the mineral districts. The engines exhibited were fair copies of English work. The educational studies of the children of the workpeople were worthy of the highest commendation. Prussia excelled us in the manufacture of steel in large masses. Those exhibited by Krupp and the Bochum Company far exceeded in size anything as yet manufactured in this country. The specimens of the Bochum Company were especially worthy of mention. The twenty-ton wheels cast together, and especially the locomotive cylinder, were the finest steel castings ever exhibited. So far as France is concerned, England had not been excelled in any department in the manufacture of iron.

Professor Rankine asked Mr. Fernie if he knew the process used by the Bochum Company.

Mr. Fernie said he thought they could only be made by the crucible process, as by that process they could keep the steel till it had parted with all the gas contained it, and so run it free from holes.

Mr. Ferdinand Kohn could state, from conversations he had had with the managers of the Bochum Company, that the Bochum steel was not manufactured by the crucible process. The mode of manufacture was a secret, but he believed the process consisted in the casting a material containing a greater quantity of carbon than steel, and afterwards subjecting these castings to a process of decarburisation.

Mr. Fernie, in answer to a question from Mr. Le Neve Foster, said he did not know why the Great Eastern had given 40 locomotive engines to a French house to build. If it was to gain time in delivery, as had been stated, that would not occur again, as considerable

additions had been made by most of the locomotive builders in England, and some new houses had commenced locomotive building.

HUMAN EXCRETA.

By W. Bridges Adams.

It is written in the annals of the ancient Britons that, when the Romans had proved these islands to be not worth their holding, and abandoned them, the people or their rulers wrote a supplicatory letter to the Romans to come back and help them, for that "the barbarians drove them into the sea, and the sea drove them back upon the shores, and they knew not what to do in their sore distress." Just such is the condition of the sewage of great cities. Barbarous engineers drive it into the sea, and the sea drives it back on the shores, and the inhabitants in their sore distress know not what to do with it. The excretions of the lower animals are dealt with by distributing them over the surface of the land and absorbing them in various modes. We fold our sheep in moveable folds from one spot to another over the surfaces of our fields. We gather up the excretions of cows, and horses, and pigs, and employ other animals to transport them on to the land with the utmost care. And we go to great distances over the sea to gather up the deposited excretions of wild birds for the same purpose. In China the human excretions are carefully gathered alike from thin and thick congregations of people. In France, and Belgium, and Italy, the same thing is done. Round the environs of Nice private receptacles are provided for the traveller and passenger along the whole course of the cultivated land, and there is a well-authenticated story of a rural villa being taken by an Englishman with a large family, for a short term of years as a residence, and who had an action brought against him by the proprietor for loss of manure consequent on he and his family having been away some part of the time travelling, and the Englishman was mulcted in damages, the proprietor alleging that, according to the custom of the country, it was an important addition to the rent, and so considered.

But it is not so everywhere. In most countries where large towns and cities exist with dense populations, and where water is at hand, the water sooner or later becomes the receptacle for every matter, wet or dry, which the inhabitants consider to be a nuisance and not capable of being turned to profitable account. They are too busy or too careless to carry these matters away, and think that they have got rid of them because they have got them out of their sight. They forget that in this world nothing is lost. Matter disappears, but only to reappear in a better or a worse form. And the great receptacle for the detritus of the world is the sea. They who dwell by small streams give their offal to the current, which then joins the main river, and that again joins the sea. The old law terms, "flotsam and jetsam," are pregnant with meaning. All those substances which the sea cannot assimilate are cast upon the shores, from the "sea foam," which is said to furnish the material of German tobacco-pipes, down to the human excretions which line the beaches of Brighton, Hastings, Scarborough, and every other sea-bathing place, or place bathed by the sea, where delicate ladies and gentlemen lave their persons with sewage furnished by the maritime population.

I was once embarking in a shore boat in the Bay of Cadiz. My umbrella—an iron-mounted one—fell overboard. The boatman, with a long, slender, lance-like boat hook, picked it up from some twelve feet of salt water. It was loaded with the filthiest, foulest, blackest, sewer mud, such as the Thames in its very worst condition could scarcely have matched. I abandoned it in utter disgust. Now, this Bay of Cadiz has been exposed to the wash of the Atlantic ever since it existed, the population is necessarily small on a spit of land, but there the human excretions have gone on accumulating for ages.

Take again, the harbour of Marseilles, where "Cabinets of ease" float on the water—the most perfect water-closets that can be imagined, where the valves never get out of order and there are no pipes to clog. A steamer comes up, with its paddles lashing the surface and stirring up from the lowest depths the reeking filth of the earliest colonists mingled with every succeeding race down to the present year of 1867. Sweep the Mediterranean round, and such is the condition more or less of every seaport town, save, perchance, where the great current sets directly through the Straits. Cross the Atlantic into the harbour of Rio de Janeiro, and there again are found the foul mud banks. Go to India, China, or elsewhere where perennial fevers exist, and there will be found the same filthy slime. And the better the inhabitants are fed, the richer they are, the worse will be the condition of the surrounding waters. The sea is the great pickling vessel that resists the process of putridity so long as the matter is beneath its waters, but when washed up along the shores, and exposed to the air and sun, it festers and gives forth its noxious vapours.

There have been many manure companies to work the open-air deposits of birds' excretions. It would be worth the while of a company to work these under water deposits of human excretions on the seashores and ports, till such time as they cease to be formed, by common sense coming to the rescue, and disenchanting us of that hydromania which has been fostered by ignorance and quackery, as though the secondary power of gravitation were a cheaper and better vehicle of transit than the primary power of elasticity. Time was that Moses commanded every man to have a paddle or spade at the end of his spear for sanitary purposes; and when George III. was King an Act of Parliament forbade, under a penalty of £50, any man from voiding the contents of his cesspool into the common sewer, and when this was done surreptitiously, the rough navvie who discovered it was accustomed to come to the owner to examine the plan of the premises, which was usually on very crisp paper, with the name of Henry Hase appended to it. And a new plan was required every year. In short, it was a case of "black mail" to escape impeachment. And now another Act of Parliament subjects to a fine all those who fail to connect their cesspools or drains with the sewers after notice. In short, mainly owing to the persevering agitation of one man, who was a bigot to the faith that water was the cheapest of all carriers, because he once saw a mass of mud swept out of a reservoir by a stream of water, the river Thames was gradually brought to the condition of an "elongated cesspool" by the aggregation of all the filth of London on its way to the sea. The floating baths vanished, so did the fish, and when the thermometer rose to 70° and 80°, the curative process set up by nature, changing the filth into gases rising into the upper air, gradually got rid of it, if the heat lasted long enough. But it offended the nostrils of the legislators in St. Stephens', who suddenly became aware of the fact that filth which is supposed to have been washed away will crop out somewhere, and so they gave the matter bodily over to the Board of Works, with power to levy taxes, and finally dispose of it in some bottomless pit, in which it should lie interred for ever.

So the Board of Works, after much manufacture of words, made some thirty-six miles of gigantic tunnels on the north bank of the Thames, and a proportionate quantity on the south, cutting off the Stygian stream wholly from the upper river, and discharging it into the lower river at Barking-creek and Crossness, or thereabouts, and at this the fish have rejoiced, and begin to reappear. And the Board flattered themselves that the foul fiend was quelled for ever. But one day, if report lies not, he appeared, and boarded them to their very worshipful noses, in the very fountain-head of their authority, at Spring-gardens, filling the chambers and offices of the immortal chiefs, and their more mortal followers, with an unac-

countable and unmistakable stench. Every one was at his wit's end, and the garrison was nearly routed; but the plumber was found equal to the occasion. He tracked the offender by his nose, and found that he issued from the sewers directly through the wastepipe of the cistern, and this in the teeth of the printed programme, "that no gas could exist in the sewers, for that the water would wash it all away."

Now dirty gas will run up hill, if there be a passage for it, as certainly as dirty water will run down hill, and the interior of the sewers is more favourable to the generation of foul gas than the open river is, for the temperature is always elevated. In short, within the sewers is mostly a summer climate. And as all house drains descend into the sewers, the gas will ascend into the houses if not effectually stopped out, or carried off by gratings or chimnies of sufficient area. The stoppers to the houses consist of water-traps, which may or may not be in good order; but if in the best possible order, the gas under pressure will pass through the water, as surely as common house gas does through water meters. And thus it is that the most elevated sites in connection with the main-drainage system are in the most unfavourable condition, and the Fleet sewer poisons portions of Hampstead-heath. Experiments have been made to convert the rain-pipes of houses into gas drains, but generally with the effect of carrying it into the attic windows, and some eleemosynary ventilation has been sought for from factory chimnies, but with no satisfactory effect.

There is yet another question. At present the outfall is at Barking-creek, introducing the noxious matter to the close proximity of the salt water; and the result will be a black bank, like that at Cadiz and Marseilles. But we are informed that this arrangement is only temporary, and that the final place of deposit is to be the Maplin sands, some forty miles from Barking, which are to be reclaimed and converted into pasture-lands, whereon the London sewage is to be changed into milk and butter for the supply of London markets. Assuming it to be so, the question arises as to the comparative cost of transit, in the dry or moist state, or in the enormous bulk of floods of water.

To begin at the beginning, what are the ingredients of sewage? The refuse of gas works, chemical works, leather dressers, soap works, and manufactories generally. With regard to the gas works, there was a time when they ejected their ammoniacal liquor, called "blue billy," into the river and poisoned the fish; but that time is gone, and almost all their coal refuse is found to be convertible into a most valuable manure. All manufacturing refuse, as well as that of slaughter houses, is too valuable to find its way into the sewers, in the mere interest of their producers. The next question is of the water used in baths and wash-houses mixed with soap, and that used for washing floors. This, though a very good manure, is not worth the saving, and is not a nuisance, and may, therefore, be suffered to run into the river or anywhere else. Then follow the animal droppings in the streets, which should be carried to the stable yards and treated as stable manure, together with decayed vegetables and refuse food. All this goes away dry or moist, and has nothing to do with the sewers. What then is it that makes sewage a nuisance and overwhelms us with poisonous stench? Only the excretions of human bodies.

Every day comes into our dwellings the food we consume. We put it carefully into safes and closets, accessible to light, air, and inspection. When we have consumed it and passed it through our bodies, it is reduced in bulk to a mere fraction of what it was. It has disappeared mainly in gases. The remnant we deposit in dark holes, with neither air, light, nor power of inspection, and we encourage it to decompose by mixing it with huge volumes of water. In the old cesspool time we kept it in a dark hole underground till we had a seven years' accumulation, in a position carefully made as inaccessible as possible, and utterly unfit for cleansing purposes. At the present day we deposit it in a dark hole and wash it down with water. Now, as the food for our consumption is brought in day by day, it follows that the remanet, which is not 10 per cent. of the original bulk or weight, could without difficulty be carried away by one-tenth of the vehicles that brought in the original bulk, if done daily; and the expense of taking it by cart, van, boat, or rail, on to the land, would be immeasurably less than that of our present closets, pipes, and machinery and water supply.

The objection arising is, that it would be needful to reconstruct all the waterclosets in London, and alter the houses at a great expense. No doubt. Like all badly-arranged systems, change for the better must involve expense. Then again it is alleged that it would be a constant nuisance, and necessarily a greater nuisance than the daily cleansing of every bedroom in London. If it could be demonstrated that fifty houses could be so treated advantageously, it would be simple multiplication to treat all London so. It would come about by degrees. One of the most marvellous things of our daily life is the precision with which the daily food of near three millions of people arrives in the exact quantities needed. Yet there is no real marvel in it. It has come about by degrees, and every one is trained to the part he has to perform. As to nuisance there are many practical means of providing against that. It is the failure to remove day by day, as fast as it is produced, that is the chief source of the putrefaction. Once make it a trade and a source of profit, it will settle down into a daily routine, and people will wonder why it was not done before.

The experience would be best gained in a small community. At this time there is a seaside village about 50 miles from London, containing about 1,200 inhabitants. It has no drainage proper. It is on a chalk soil, varied with sand and clay. The houses are about 220 in number. In the back yard, which usually measures about 20 square yards superficial, two holes are dug within a few feet of each other, one for the privy, 8 to 10 feet deep, the other for the well, about 30 feet deep, and usually so arranged that the privy can filter into the well. The streets have side channels, formed of bricks or of flint stones. Several pigstyes also exist. After dark the inhabitants appear to draw water from these wells to sluice out their yards and privies, the liquid running down the gutters to a large open cesspool at the town's end, and from thence it flows in a covered drain to another open cesspool situated in the dried-up bed of an old harbour. At high tide the sea-water washes through a shingle bank and into the cesspool, and spreads its contents around, poisoning the atmosphere, which is fortunately neutralised by the sea air, otherwise the inhabitants of two convalescent hospitals would remain invalided. There is plenty of garden land and fields close to the town, but though the farmers send their carts in for stable manure and slaughterhouse refuse, they will have nothing to do with the drainage sewage. They say that it is spoiled by the water, but they would gladly take it if without sea-water, which pickles it, and in a transportable condition.

Speculators, animated by the lucre of gain, have cast their eyes upon this secluded place with a view of making it a watering-place, and making fortunes by building. So long as the population was under 1,000 the nuisance was very mild and amenable to ventilation, but if the population increases to 2,000 the chances are that an epidemic will decimate them, and so the speculators are urging on a system of drainage on the usual stereotyped plan. First, a deep sewer is to be made, of some two miles in length; then drains are to be made to connect it with each house, to run the matter into the sea; then all the privies are to be formed into water-closets. And when all this is done a water supply must be formed either by a reservoir on the downs or by a chalk well, and pumping apparatus with the usual

concomitants of pipes and cisterns. That this would cost many thousand pounds is quite clear, and if the sewage is to be utilised there must be another large outlay in pumping machinery for that purpose. If not so utilised the visitors will continue to bathe in it as it is washed along the shore.

Now it is a very practicable thing to dig out the cesspools and fill them up with chalk, and then to replace them by a shallow tray of slate or cast-iron, with a gently-sloping bottom at the level of the ground, something similar to the shallow wooden box in which bricklayers mix their sand and lime for mortar. Pulverised chalk—to be had in any amount—placed in this tray, would receive and absorb the fœcal matter, putting it into the condition of mortar; and in that state the farmers would gladly cart it away every day, or two or three days. The wells would thus be free from impurities, and would quickly attain a wholesome condition.

The cost of the alteration would scarcely exceed forty shillings per house, or under £500 for the whole town. The annual value of the materials, according to agricultural estimates, should be £600. In some few new houses which have been built there are water-closets, but they are connected to porous cesspools, poisoning the water supply. In building other houses, saving the cost of the water-closet would be a material advantage, saying nothing of the cistern.

In criticising the sewage system of London as a fallacy in principle, I am far from denying its existing utility. Before it was commenced I discussed it with a then member of the Board of Works, and we both arrived at the same conclusion—that the mass of filth was so great that it was absolutely necessary to turn a river through the Augean foulness to carry it off in flood. The cesspools, wherever they were on porous soil, were not gathering pits but distributing pits, polluting the whole subsoil far and near, just as the gas pipes are now doing, to such an extent that it would be worth while to dig up the ground for two feet round them and use it in a secondary condition to charge the gas retorts and reproduce it.

If this system of water cleansing and underground sewers is to continue, the quantity of water required will be continually on the increase, and it will be absolutely necessary to erect shafts at short intervals along the line of the sewers, and of considerable height, to carry off the noxious gases constantly generating. When the time comes that we cease to require water for the closets we shall have a greater supply for our baths, and the Board of Works will have ample work cut out for them in the future, for the physical government of this great metropolis.

Fine Arts.

Encouragement of Music in France.—An Imperial decree, founded on a report made by the Director-General of Theatres to the Minister of the Beaux Arts, was published last month, respecting the encouragement of musical composition. The Director-General, M. Camille Doucet, says, that while the other fine arts have the advantage of public exhibitions, musical compositions can only be heard in private establishments or at theatres, the admission to which is difficult for the public at large, and that the managers of the lyrical theatres are compelled, in their own interest, to perform the works of popular or recognised masters, to the almost total exclusion of young composers; that there is also another difficulty in the way of the young musician, who, to obtain a libretto, is compelled to seek an associate in his labours, and often fails in this, or suffers by the incompetence of his collaborateur. Means have been taken of late to afford the laureats of the Conservatoire opportunities of having their compositions performed in one or other of the operatic theatres; and the new decree establishes competitive performances at the three lyrical theatres of Paris; at the Opera there are to be two competitions, one for a poem in three acts, and the other for setting the prize poem or libretto to music. At the Comic Opera a poem, also in three acts, is to be selected by the director, and then submitted to a competition amongst composers; while at the Theâtre Lyrique, in order to afford scope for all tastes and forms of composition, each composer will be at liberty to select his own libretto, without any restrictions whatever as to its form or origin. The compositions, as well as the libretti, will be submitted to the decision of juries elected by the competitors themselves. The successful works are to be performed at each of the three operatic theatres of Paris, within a year from the period of the prizes being awarded; the others may be performed in the provinces, and with this view directors of operatic theatres will be admitted to the final performances of the composition before the juries. In pursuance of the plan here sketched out, it is decreed that three competitions be immediately opened. At the Opera, libretti are to be sent in before the 15th of December in the present year, and the prize poem will be offered for composition during the months of February to July inclusive, of the coming year. The prize for the selected poem is 3,000 francs (£120); and in case neither of the libretti shall be deemed worthy of being set to music, then the best of those offered is to receive half the amount of the prize. The cost of the prizes is divided between the Ministry of the Beaux Arts and the Director of the Opera. The competition for a poem opened at the Opera Comique on the 30th of last month, and that for the composition of the prize libretto is announced for the 1st May, 1868. The competition at the Théâtre Lyrique also opened in August, and will close on the 16th of the same month next year. The jury in each case consists of nine members. Should any musical composition be deemed the best of those presented, but not sufficiently meritorious to be performed in Paris, the author of it will receive a secondary prize, equivalent to £80. The competitions at the Grand Opera are open to all French composers, even though they may have had an opera performed there or elsewhere. Those who have had a composition of more than one act performed at the Opera or the Opera Comique are excluded from the competition at the latter theatre. Lastly, those who have had an opera of more than one act represented at either of the three operatic theatres are excluded from the competition of the Théâtre Lyrique.

Manufactures.

Swedish Industry at Exhibitions.—The first industrial exhibition at Stockholm was held in 1823, when there were but 62 exhibitors and 436 objects shown, the second, in 1834, had 290 exhibitors and 2,002 articles exposed; the third, in 1840, 200 exhibitors and 1,075 objects; the fourth, in 1844, 210 exhibitors and 1,336 objects; the fifth, in 1847, 243 exhibitors and 2,007 objects; the sixth, in 1851, 278 exhibitors and 2,687 articles shown. These exhibitions were of a character purely provincial, but of a growing importance, and of late years were held simultaneously with the great agricultural meeting. The last local exhibition of Stockholm, in 1866, was a collective one for the Scandinavian kingdoms and Finland, and the number of exhibitors and objects shown was as follows:—

	Exhibitors.	Objects.
Sweden	2,200	2,485
Norway	590	675
Denmark	422	431
Finland	206	319
	3,418	3,910

The Fine Arts' Exhibition for the four countries, which took place at the same time, gives the following results:—

	Exhibitors.	Objects.
Sweden	99	355
Norway	53	169
Denmark	54	109
Finland	18	46
	224	679

Passing now to International Exhibitions, the number of Swedish exhibitors who took part were—at London, in 1851, 117; at Paris, in 1855, 417; at London, in 1862, 608; and at Paris, in 1867, 545. The number of rewards carried of by Sweden this year at Paris was five gold medals, 32 silver medals, 75 bronze medals, and 80 honourable mentions. Also a grand prize of 1,000 francs to the Company Hoganais (colliery and grand industrial establishment).

Manufactures in Sweden.—In 1865 there were 2,315 manufactories of different kinds in Sweden, employing 30,085 workmen, besides 168 temporarily closed. The greatest number and the most active of these were in the governments of Gottenburg, Ostergothic, and the town of Stockholm. The motive power of the different factories was equal to 7,812 horses. The number of factories where cattle was employed was 140; those using hydraulic power, 409; and compressed air, 225. The factories, &c., included 15 cotton mills, with 1,522 workmen; three flax mills, with 108 workmen; 18 for cotton yarn, with 2,531 workmen; 10 sugar refineries, with 1,090 workmen; 85 cloth manufactories, employing 3,591 hands; 97 machine workshops, employing 4,927 persons; 95 tobacco manufactories, with 2,393 hands; 658 tanneries, with 1,749 workmen; 73 paper works, with 1,613 workmen; 12 candle works, with 198 workmen; 22 glass works, with 1,221 workmen; 42 oil works, with 180 hands; 12 soap works, with 95 men; 412 dye works, with 944 hands; nine wool-spinning works, five silk-spinning works, and two porcelain works, with 549 hands.

Commerce.

Coal in Prussia.—It appears by the report of Mr. Consul-General Crowe, of Leipsic, that the coalfields of the valley of the Ruhr extend over a surface of 115 square miles, and are supposed to contain about 40,000,000,000 tons of fuel. The production in 1855 amounted to 3,252,223 tons, and the number of hands employed was 22,235; in 1865 the production reached 8,535,614 tons, having nearly trebled itself in the ten years, and the number of hands employed had increased to 39,871. The price of coal at the pit's mouth was, on an average, for best, 5s. 6d. per ton in 1866. The wages of the coal districts vary from 11 sgr. (about 13d.) for boys, to 2s. and 2s. 6d. for men for a day of ten hours. Labourers who earn more do so by extra exertion in the mines where piecework is usual. The difference between the district and similar ones in England is that you find there cheaper wages and longer hours of work, and, as a consequence, cheaper coal at the pit's mouth than in Great Britain. The carriage of coals on railways being on an average four-fifths of a halfpenny per ton per mile, and the chief centres of Rhenish industry being close to the collieries, machinery can be driven less expensively there than in England. A network of railways unites the collieries with all the great towns of the neighbourhood—Duisburg, Düsseldorff, Elberfeld, Barmen, Hagen, Iserlohn, Witten, Dortmund, Essen, and Ruhrort. A steam ferry takes the coal over the Rhine at Ruhrort into the silk and cotton manufactories of Crefeld, Viersen, and Gladbach. At Ruhrort a vast harbour, formed by the confluence of the Ruhr with the Rhine, serves as port of shipment for the coal, which is towed up to Mayence and Mannheim in barges. At Duisburg shipments are made from the quays of the Rhine. The war of 1866 curtailed the facilities of transport, and withdrew men from productive labour, and the hands employed on the Ruhr coalfields were reduced to 37,686; but through a more general use of machinery the production of the year slightly increased, and reached 8,583,362 tons. New railways increase the export of produce, and year by year the area over which the export of Ruhr coal takes place is extended. Little or no English coal is now sent inland from Antwerp, Rotterdam, or any of the Dutch and Belgian harbours. The Ruhr collieries feed the great industrial centres of the Lower Rhenish provinces, and compete with England in the Dutch and North German markets. The coalowners are striving for new communications to the westward, and there is no doubt that if they could rival England in the quality as well as in the price of coal they might push us hard enough in certain quarters. They admit the superiority of English sea coal, but they may, and perhaps do, calculate on the possible exhaustion of Great Britain. It is scareely possible to describe the pleasure and excitement caused in the Ruhr districts by the fact that in 1865 and 1866 Westphalian coal was carried with profit to the Belgian coal basins of Charleroi and Mons, and even over the frontier into France. None of the coal mines exceed 150 fathoms in depth; some have double, most have but one shaft divided by hoardings into halves for the passage of air and the working of the cars. Substantial buildings cover the shafts, and contain the necessary steam engines and boilers. The seams are numerous, and are worked at various levels from the same shaft. Some seams are as thin as $2\frac{1}{2}$ feet; the thickest are rarely above $4\frac{1}{2}$ feet. The quality of the coal is various. A great number of the labourers in the Ruhr coal districts are vagrant. They do not universally keep to mining as the business of their life. They are prone to change, and the same hand turns to two or three different occupations in the same number of years. They have yet shown no desire to combine or to form trades unions. There is nothing organised among them, except a society for advancing necessaries on a certainty of repayment from wages at monthly intervals. The workmen complain of competition among each other. The owners of mines, on the contrary, complain that labour is too scarce, and threatens to be too dear, so that there are limits to the expansion of works.

Colonies.

Gold in Melbourne.—The total amount of gold exported from the colony of Victoria since the commencement of this year is 7,940,65 oz., of which 83,348 oz. were transhipped from New Zealand. During the corresponding period of the previous year the entire quantity exported was 7,578,48 oz., of which 1,338,84 oz. were from New Zealand.

The Post-Office in Victoria.—There are 555 post-offices in the colony of Victoria, and, according to the annual report, the total number of town and country letters posted in 1866 was 6,650,000. There are 203 people employed at the General Post-office in Melbourne. 8,631,133 letters have been received here and dispatched, and 5,438,388 newspapers. 11,257,974 stamps were issued out of 12,665,694 manufactured. The total cost to the colony of the English mail service was £28,774, of which £21,542 was received for postage, leaving a deficiency of £7,232. £60,119 money orders, representing £218,850 were issued against £50,666, representing £186,855 in 1865. 5,703 accounts were opened at the New Post-office savings bank, the number remaining open at the end of the year being 6,774, of which 5,929 represented sums not over £20. £85,381 was received, and £43,348 paid. The amount of deposits at the savings bank on the 31st December, 1866, was £58,690. The balance on the 1st January, 1866, was

£15,467. The repayments during the year were £43,348.

SOUTH AUSTRALIAN PRODUCE.—The total value shipped during the quarter ended June 30, 1867, is £521,926, of which £419,899 went from Port Adelaide. The latter amount includes £137,483 value of mineral, and £237,693 of bread stuffs.

FARMS IN VICTORIA.—For some years past the agricultural statistics published in Victoria have included tables exhibiting the acreage of the different farms arranged in various classes. From the tables prepared there are (including squatters) 11,561 landholders in the province, occupying in the aggregate upwards of eight millions of acres of land. Between 1 and 5 acres there are 1,188 persons, holding among them 3,114 acres; between 5 and 15 acres there are 992 persons, holding among them 8,408 acres; between 15 and 50 acres there are 1,264 persons, holding among them 37,608 acres; between 50 and 100 acres there are 2,214 persons, holding among them 169,110 acres; between 100 and 200 acres there are 2,713 persons, holding among them 392,492 acres; between 200 and 350 acres there are 1,715 persons, holding among them 445,017 acres; between 350 and 500 acres there are 601 persons, holding among them 248,116. Beyond 500 acres there is no classification, although there are many farms where grazing is combined with agriculture, and even where it is not, that are of larger area than 500 acres.

Notes.

TRANSFORMATIONS IN PARIS.—An immense place is in course of formation near the site of the oldest fountain in Paris, that of the Château d'Eau, where the new Boulevards of Prince Eugène and Magenta join the old ones of Saint Martin and and the Temple; the space laid open by the junction of these four grand roads is very large, and in the centre of it a large place is being prepared for a magnificent fountain, around which will be broad promenades for pedestrians, who will thus escape the dangers arising from the meeting of so many roads at one spot. But the most remarkable work of the kind is the transformation of the famous old hill of Montmartre and all the surrounding district; the new Boulevard Magenta is being carried through the district, and will eventually communicate with a grand new road to connect Paris and Epinay; and the Butte Montmartre, like its sister, the Butte Chaumont, after supplying Paris with plaster for centuries, will be connected with a large public garden. Those who visit Paris before the termination of the Universal Exhibition, and desire to form an idea of the magnitude of the demolitions and changes carried on in the streets and roads of Paris during the last few years, should not fail to visit the two spots in question.

DISCOVERY OF ROMAN COINS.—A very remarkable discovery of Roman money has just been made in the very heart of Paris, in one of the courts of the Lycée Napoleon. A few coins were discovered only a few feet beneath the surface of the soil, and upon further search no less than 715 pieces of money, all in gold, have been brought to light. A large proportion of these coins are in excellent preservation. They are of the time of Nero, Vitellius, Vespasian, Titus, Domitian, Trajan, Antoninus, Marcus Aurelius, Commodus, Septimus Severus, the latest in date being those of Caracalla. No other Roman vestiges accompanied the coins.

BOTANICAL NOMENCLATURE.—A botanical congress met in Paris on the 16th of August, and continued its labours until the 28th. There was a good attendance of botanists from various countries, under the presidence of M. A. de Candolle, of Geneva, and some interesting papers were read, which are to be incorporated in a report. The important fact, however, is the adoption of a code of regulations for botanical nomenclature, drafted by M. de Candolle, revised by a commission, and afterwards discussed at a full meeting of the congress, under the presidency of M. Dumortier, a member of the Belgian chamber of deputies. The code, which consists of 69 articles, was finally adopted unanimously as "a guide for botanical nomenclature," and is to be printed.

Patents.

From Commissioners of Patents' Journal, September 20th.

GRANTS OF PROVISIONAL PROTECTION.

Axles—2341—G. Buxton and S. Bann.
Boilers—2389—J. Murgatroyd.
Bone, &c., crushing—2441—W. E. Gedge.
Boots and shoes—2457—J. Macintosh and W. Boggett.
Bottles, &c.—2387—A. S. Stocker.
Carding engines—2405—R. King, J. Lowden, and W. Gartside.
Cartridges—2431—W. R. Lake.
Coal, &c., cutting—2451—J. Elliott.
Cotton, &c., preparing—2411—H. Higgins and T. S. Whitworth.
Fabrics, ornamenting and uniting—2439—W. Muir.
Fire-arms, breech-loading—2403—J. Newark.
Furnaces—2313—E. B. Wilson.
Furnaces—2395—C. W. Siemens.
Furnaces—2425—A. and E. Wigzell.
Gas burners—2435—W. C. Thurgar.
Green colour—2437—W. R. Lake.
Hats—2383—A. Martin.
Iron and steel rails, cutting up—2463—J. and G. W. Dyson and S. Martin.
Iron plates, protecting from action of sea-water—2413—J. McIntyre.
Kitcheners—2461—J. Douglas.
Lever-watch movements—2455—W. B. Smith.
Looms—2401—A. Smalley, B. Croasdale, and W. L. L. Leaver.
Looms—2445—T. Sagar and T. Richmond.
Matches, vesta, cutting wax threads, &c., for—2231—J. Birch.
Mattresses, elastic—2399—J. Mangnall.
Metallic packing—2419—W. S. Ashton.
Railway carriages, warming—2415—F. Ziffer and W. Goodbrand.
Railway trains, &c., propelling, &c.—2465—W. Muir.
Root crops, hoeing, &c.—2391—C. E. Hall.
Roots, spacing and digging—2427—J. Hanson.
Rudders—2469—W. E. Newton.
Saw frames, applying motive-power to—2393—J. Robinson and J. Smith.
Screw presses—2433—F. J. Cleaver.
Screw propellers—2443—J. A. A. Etaix.
Ships, steering—2423—G. Allibon and E. Wilson.
Steering apparatus—2467—W. E. Newton.
Umbrellas and parasols—2447—J. E. Boyce and R. Harrington.
Vulcanizable compounds, preparing—2449—G. G. Tandy.

From Commissioners of Patents' Journal, September 24th.

PATENTS SEALED.

571. A. V. Newton.
863. A. Wyley.
868. W. Seaton.
869. A. S. Stocker.
874. E. O. Greening.
875. A. F. Langin.
885. R. Moreland.
886. G. E. Donisthorpe.
891. E. W. Shirt.
895. J. M. Laurent.
901. J. Werndl.
906. J. Grundy.
915. M. P. W. Boulton.
916. N. Thompson.
922. E. H. Aydon and E. Field.
923. J. G. Tongue.
926. J. A. Simpson.
929. M. Henry.
931. W. B. Hilliard.
933. W. Clark.
936. E. W. Ball.
943. E. S. Jones.
947. W. B. Woodbury and R. H. Ashton.
951. J. J. McComb.
954. W. Clark.
977. J. J. and A. Meyer.
985. W. Clark.
988. W. Clark.
990. J. Pickering.
1007. W. R. Lake.
1018. H. Buss.
1047. G. F. James.
1067. J. H. Johnson.
1069. W. R. Lake.
1211. A. M. Clark.
1222. J. Dewar.
1576. H. A. Bonneville.
1577. H. A. Bonneville.
2143. W. Easterbrook.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

2278. F. Yates.
2329. T. and T. F. Walker.
2404. W. F. Henson.
2304. W. P. Struvé.
2315. E. T. Hughes.
2507. G. Coles, J. A. Jaques, and J. A. Fanshawe.
2364. H. Bennison.
2328. J. Clark.
2338. W. B. Woodbury.
2340. J. H. Kidd & J. C. Mather.
2361. J. Mackay.
2397. G. Haseltine.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

2264. H. Stead and H. Gledhill.
2292. J. and J. Cash.
2461. T. Barnett.
2348. M. Jacoby and J. Stones.
2326. J. Haworth.

Journal of the Society of Arts.

FRIDAY, OCTOBER 4, 1867.

Announcements by the Council.

Artizans' Visits to Paris.

Her Majesty's Government have transmitted to the Society of Arts, in aid of the fund raised by the Society for assisting workmen, specially selected from various trades, to visit and report on the Paris Exhibition, the sum of £500, which was granted conditionally on the Society raising a like amount by public subscription.

The amount received up to the present time is as follows :—

H.R.H. the Prince of Wales, President	£31	10	0		
Society of Arts	105	0	0	£518	14 0
Other Subscriptions already published	382	4	0		
Jacob Brett				2	2 0
Her Majesty's Government.. ..				500	0 0
Total				£1,020	16 0

Subscriptions may be forwarded to the Financial Officer, at the Society's House.

Prizes for Art-Workmen.*

The Council of the Society of Arts hereby offer Prizes for Art-Workmanship, according to the following conditions :—

I. The works to be executed will be the property of the producers, but will be retained for exhibition, in London and elsewhere, for such length of time as the Council may think desirable.

II. The exhibitors are required to state in each case the price at which their works may be sold, or, if sold previously to exhibition, at what price they would be willing to produce a copy.

III. The awards in each class will be made, and the sums specified in each class will be paid, provided the works be considered of sufficient merit to deserve the payment; and, further, in cases of extraordinary merit additional awards will be given, accompanied with the medal of the Society.

IV. Before the award of prizes is confirmed, the candidates must be prepared to execute some piece of work sufficient to satisfy the Council of their competency.

V. *Bona-fide* Art-workmen only can receive prizes.

VI. Although great care will be taken of articles sent for exhibition, the Council will not be responsible for any accident or damage of any kind occurring at any time.

VII. Prices may be attached to articles exhibited and sales made, and no charge will be made in respect of any such sales.

VIII. All the prizes are open to male and female competitors, and in addition, as regards Painting on Porcelain, Cameo-cutting, Engraving on Glass, Decorative Painting, and Wall Mosaics, a second set of prizes, of the same amounts, will be awarded among female competitors. If a female desire to compete in the female class only, she must declare her intention accordingly. The originals of the works prescribed may be seen at the South Kensington Museum.

IX. Any producer will be at liberty to exhibit, either in his own name or through his workmen, any work or works as specimens of good workmanship, in the various classes, provided that the work or works be accompanied with a statement of the name or names of the artizans who executed their respective portions; and if the work or works be sufficiently meritorious, extra prizes will be given to the artizans who have executed them.

X. Artizans may, if they think fit, exhibit works executed by them after other designs than those stated above, in any of the classes. Such works may contain the whole or portions of the prescribed designs, and must be of a similar style and character. Competitors must specify the class in which they exhibit. If the works be sufficiently meritorious extra prizes will be awarded.

XI. All articles for competition must be sent in to the Society's house on or before Saturday, the 21st of December, 1867, and must be delivered free of all charges. Each work sent in competition for a Prize must be marked with the Art-workman's name, or, if preferred, with a cypher, accompanied by a sealed envelope giving the name and address of the Art-workman. With the articles, a description for insertion in the catalogue should be sent. The works will be exhibited at the Society's House, and afterwards at the South Kensington Museum.

Casts may be seen at the Society of Arts, Adelphi, London, and the Schools of Art at Edinburgh, Dublin, Manchester, Glasgow, Birmingham, and Hanley in the Potteries.

Photographs and rough casts in metal, &c., may be purchased at the Society of Arts, John-street, Adelphi, at the prices named.

The plaster casts of the examples in classes 2 and 4 (except bas-relief 4*a*) may be obtained from Mr. Franchi, 15, Myddelton-street, Clerkenwell, E.C.; the other casts from Mr. D. Brucciani, Galleria delle Arti, 40, Russell-street, Covent-garden, W.C.

*** The Council are happy to announce that several of the works which received first prizes in the competitions of 1863, 1864, 1865, 1866, and 1867, have been purchased by the Department of Science and Art, to be exhibited in the South Kensington Museum and the Art Schools in the United Kingdom.

FIRST DIVISION.

Works to be Executed from Prescribed Designs.

For the successful rendering of the undermentioned designs in the various modes of workmanship according to the directions given in each case.

Class 1.—Carving in Marble, Stone, or Wood.

(*a.*) *The Human Figure.*—One prize of £15 for the best, and a second prize of £7 10s. for the next best, work executed in marble or stone, after part of a frieze of a chimney-piece, by *Donatello*, No. 5,795, in the South Kensington Museum; or a relievo in terra cotta, Amorini supporting an entablature; original in the South Kensington Museum, No. 11,940. Dimensions—Two-thirds the size of the cast (linear).—The design may be adhered to strictly or adapted to any architectural purpose.

[Cast—Fifteen Shillings; Photograph—One Shilling.]

(*b.*) *Ornament.*—One prize of £10 for the best, and a second prize of £5 for the next best work, executed in marble, stone, or wood after a carved chair-back in the South Kensington Museum. Dimensions—To be two-thirds of the cast (linear).

[Cast—Twelve Shillings; Photograph—One Shilling.]

* The Worshipful Company of Salters contribute £10 annually to this prize fund. The Worshipful Company of Clothworkers contribute £10 10s. to this prize fund. The Worshipful Company of Goldsmiths contribute £15 "for the encouragement of workmen in the precious metals." Particulars of the Goldsmiths' Company's prizes are given. The North London Exhibition prize consists of the interest of £167 7s. 3d., invested in the name of the Society of Arts, to be awarded by the Council "for the best specimens of skilled workmanship" at the Society's Exhibition of the works sent in for the prizes named above.

(*c.*) *Ornament.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed in stone, after a *Gothic bracket* in the Architectural Museum. Dimensions the same as the cast. In this design the details may be improved by the introduction of small animals, and the human head may be changed according to the taste of the art-workman.

[Cast—Ten Shillings; Photograph—One Shilling.]

(*d.*)—One prize of £20 for the best, and a second prize of £10 for the next best, work carved in *wood* after a panel in carved oak. Original in South Kensington Museum, No. 274. Dimensions—Optional.

[Photograph—Sixpence.]

(*e.*)—One prize of £15 for the best, and a second prize of £7 10s. for the next best, work carved in *wood* after the entablature of a chimney-piece carved in wood, in the South Kensington Museum, No. 85.'64. Dimensions—Same size as original.

[Photograph—One Shilling.]

(*f.*) *Ornament.*—One prize of £10 for the best, and a second prize of £5 for the next best, work carved in wood after an *Italian picture frame* in the possession of Henry Vaughan, Esq. Dimensions optional.—This design may be adhered to strictly or adapted in such manner as the workman may think fit.

[Photograph—Two Shillings.]

(*g.*) *Ornament carved and gilt.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed in wood, carved and gilt after a *Console Table* in the South Kensington Museum, No. 6,497, of the period of Louis XVI. The work to be carved roughly in wood, then to be prepared in the white by a gilder, then cut up or carved in the white by the carver, then to be gilt in mat and burnished gold. As such work may probably be executed by two persons, the prize will be apportioned as the judges may determine.

[Photograph—One Shilling.]

Class 2.—Repoussé Work in any Metal.

(*a.*) *The Human Figure as a bas-relief.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after the Martelli Bronze Mirror Case, No. 8,717. in the South Kensington Museum—dimensions, $6\frac{3}{4}$ inches diameter; or a panel in low relief, the Virgin and Child, in South Kensington Museum, No. 66.'66. Dimensions—One-third of original.

[Cast of Mirror Case—Two Shillings; Photograph—One Shilling. Cast of Bas-relief, 3s. 6d.

(*b.*) *Ornament.*—One prize of £5 for the best, and a second prize of £3 for the next best, work executed after a tazza in silver, date 1683, the property of Sir W. C. Trevelyan, Bart., now in the South Kensington Museum. Dimensions—The same as the model.

[Photograph—One Shilling.]

Class 3.—Hammered Work, in Iron, Brass, or Copper.

Ornament.—One prize of £7 10s. for the best, and a second prize of £5 for the next best, work executed after a knocker in wrought iron, in the South Kensington Museum, No. 9,007.

If the work is executed in brass or copper, it should be rendered subject to the conditions of these metals, either as split and riveted or partly beaten from the sheet, and the awards will be made in view of these conditions. The work must not be covered with colour or any coating which masks the workmanship.

[Photograph—One Shilling and Threepence.]

Class 4.—Carving in Ivory.

(*a.*) *Human Figure in the round.*—One prize of £15 for the best, and a second prize of £10 for the next best, work executed after an ivory plaque of Silenus and Amorini, by *Fiamingo*, No. 1,059, in the South Kensington Museum; dimensions—five inches greatest length; or after a relievo in marble, the Virgin and Child, No. 4,233 in the South Kensington Museum. Dimensions—To be reduced in height by one-third (linear).

[Cast of the Plaque—Two Shillings; and Photograph of the Virgin and Child—One Shilling each.]

(*b.*) *Ornament.*—One prize of £7 10s. for the best, and a second prize of £5 for the next best, work executed after an ivory crozier head, in the South Kensington Museum, No. 214.'65. Dimensions—The same as the cast.

[Cast—One Shilling.]

Class 5.—Chasing in Bronze.

(*a.*) *The Human Figure.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a panel in low relief, the Virgin and Child, in the South Kensington Museum, No. 66'66.

A rough casting in bronze, on which the chasing must be executed, will be supplied by the Society at cost price.

[Plaster Cast—Three Shillings and Sixpence.]

(*b.*) *Ornament.*—One prize of £10 for the best, and a second prize of £7 10s. for the next best, work executed after a silver gilt missal cover, in the South Kensington Museum, No. 2,639.

[Photograph—One Shilling.]

Class 6.—Etching and Engraving on Metal—Niello Work.

Prizes of the Goldsmiths' Company.

Ornament.—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after arabesques by Lucas Van Leyden, A.D. 1528. No. 18,968 in the South Kensington Museum. To be engraved the height of the photograph, and, if round a cup or goblet, repeated so as to be not less than nine inches in length when stretched out.

[Photograph—Sixpence.]

Class 7.—Enamel Painting on Copper or Gold.

(*a.*) *The Human Figure.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a panel in low relief, the Virgin and Child, in the South Kensington Museum, No. 66.'66. Ground to be blue. Dimensions—Half size of original.

[Photograph—One Shilling; Cast, Three Shillings and Sixpence.]

(*b.*) *Ornament.*—One prize of £5 for the best, and a second prize of £3 for the next best, work executed after the back of a plate, No. 8,428, in the South Kensington Museum. Ground to be blue. Dimensions—The same as the Photograph.

[Photograph—Sixpence.]

Class 8.—Painting on Porcelain.

(*a.*) *The Human Figure.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a photograph of a drawing by *Raphael*, No. 20 in the South Kensington Museum. Dimensions—The same as the Photograph. This work is to be coloured according to the taste of the painter.

[Photograph—Ninepence.]

(*b.*) *Ornament.*—One prize of £5 for the best, and a second prize of £3 for the next best, work executed after a photograph of ornament by *Aldegrever*, No. 2,118 in the South Kensington Museum, and coloured according to the taste of the painter, with a gold ground. Dimensions—Double the size of the Photograph (linear).

[Photograph—Sixpence.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

Class 9.—Decorative Painting.

(*a.*) *Ornament.*—One prize of £5, and a second prize of £3, for a work, executed after a photograph of ornament by *Aldegrever*, in the South Kensington Museum, No. 2,118. Dimensions—length, 3 feet.

[Photograph—One Shilling.]

(*b.*) *Ornament.*—One prize of £5, and a second prize of £3, for a work, executed after a *picture frame*, in the South Kensington Museum, No. 7,820. Dimensions—5 feet by 3 feet 11½ inches, outside measure. The works to be executed on canvass, either with or without stretchers, in cool colours. Some lines of the mouldings may be gilt.

[Photograph—One Shilling and Sixpence.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

Class 10.—Inlays in Wood (Marquetry, or Buhl), Ivory or Metal.

Ornament.—One prize of £5 for the best, and a second prize of £3 for the next best, work executed after a guitar inlaid with ivory, ebony, and mother-o'-pearl. The ornament to be of the same dimensions as the original, but may be applied to any object. No. 9,611 in the South Kensington Museum.

[Photograph—Sixpence.]

Class 11.—Cameo Cutting.

(*a.*) *Human Head.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a bust of *Clytie* in the British Museum—The head only.

[Cast of the Head—Five Shillings.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

Class 12.—Engraving on Glass.

Ornament.—One prize of £10 for the best, and a second prize of £3 for the next best, work executed after arabesques by Lucas Van Leyden, A.D. 1528. No. 18,968 in the South Kensington Museum. To be engraved the height of the engraving; and if round a glass or goblet, repeated so as not to be less than 9 inches long when stretched out.

[Photograph—Sixpence.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

Class 13.—Wall Mosaics.

Human Head.—One prize of £10 for the best, and a second prize of £7 10s. for the next best, work executed after a *Female Head* (over the lame cripple) in the cartoon of the "Beautiful Gate." The dimensions of the work should be regulated by the size of the tesseræ proposed to be used, which size may be left to the choice of the artist. Although desirable, it is not necessary to execute the whole subject in actual mosaic. The original is at the South Kensington Museum. Tesseræ of two sizes may be obtained from Messrs. Minton, Stoke-upon-Trent; Messrs. Maw and Co., Brosely, Shropshire; Messrs. Powell and Sons, Temple-street, Whitefriars; and Messrs. Jesse Rust and Co., Carlisle-street, Lambeth.

[Photograph—One Shilling.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

Class 14.—Gem Engraving.

(*a.*) *Human Head.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a cameo portrait of Savonarola, No. 7,541 in the South Kensington Museum. Dimensions—The same as the cast.

[Cast—Sixpence.]

(*b.*) *Full-length Figure.*—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a small Wedgwood medallion, No. 5,827 in the South Kensington Museum. Dimensions—The same as the cast.

[Cast—Sixpence.]

Class 15.—Die Sinking.

Full-length Figure.—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a Wedgwood Medallion in the South Kensington Museum, No, 3,470. Dimensions—The same as the photograph.

[Cast—Sixpence; Photograph—Sixpence.]

Class 16.—Glass Blowing.

Ornament.—One prize of £7 10s. for the best, and a second prize of £5 for the next best, work executed after an original in the South Kensington Museum, No. 6,785. Dimensions—As given in the wood engraving.

[Photograph—Sixpence.]

Class 17.—Bookbinding.

(*a.*) *Bookbinding.*—One prize of £7 10s. for the best and a second prize of £5 for the next best, work executed in bookbinding, after a specimen in the South Kensington Museum, No. 164.'64. The work to be bound should be some classical author of the size given. Dimensions—The same as the photograph.

[Photograph—One Shilling.]

Class 18.—Embroidery.

Ornament.—One prize of £5 for the best, and a second prize of £3 for the next best, work executed, either after *Two Angels* in an example in the South Kensington Museum, No. 1194.'64, or an Italian Silk in the South Kensington Museum, No. 7,468, which may be adapted to a screen. Dimensions—According to the taste of the embroiderer.

[Photograph—German, Sixpence; Italian, One Shilling.]

Class 19.—Illuminations.

Ornament.—One prize of £5 for the best, and a second prize of £3 for the next best, copy made from an Altar Card, attributed to Giulio Clovio, in the South Kensington Museum, No. 2,958, or from a MS. border, date 1450, No. 3,057, in the South Kensington Museum. Dimensions—One-half larger than the Photograph (linear).

[Photograph—Two Shillings.]

SECOND DIVISION.

Class 20.—Wood Carving.

(*a.*) *Human figure in the round, in alto or in bas relief. Animals or natural foliage may be used as accessories.* 1st prize of £25 and the Society's Silver Medal. 2nd prize of £15. 3rd prize of £10.

(*b.*) *Animal or still-life. Fruit, flowers, or natural foliage may be used as accessories.* 1st prize of £10. 2nd prize of £7 10s. 3rd prize of £5.

(*c.*) *Natural foliage, fruit, or flowers, or conventional ornament, in which grotesque figures or animals may form accessories, preference being given where the work is of an applied character for ordinary decorative purposes, as representing commercial value.* 1st prize of £10. 2nd prize of £7 10s. 3rd prize of £5.

(By order)
P. LE NEVE FOSTER, *Secretary.*

Proceedings of Institutions.

Huddersfield Mechanics' Institution.—The twenty-sixth annual report says that the results of the past year have been most encouraging. The classes have all been very well attended; and that the instruction given is valuable has been satisfactorily proved, for some of the old pupils are at work with the principal manufacturers and tradesmen of the town, not employed as mechanics and workmen, but in places of trust, which they have attained by their intelligence and good conduct. The number of members in 1866 was 1,256, against 1,089 in 1865. The receipts from the pupils were, in 1865, £321 7s. 8d.; in 1866, £341 12s. 1d. The annual subscriptions were, in 1865, £301 7s.; in 1866, £317 2s. The average weekly class attendance was, in 1865, 1,050; and, in 1866, 1,265. Upwards of 270 vols. have been added to the library during the year, which is now open every night except Monday, and contains 4,400 volumes. The issues in 1865 were 7,289, and in 1866, 8,660 volumes. The fortnightly meetings have done a great amount of good, and there is no reason to doubt the continuance of their popularity. They consist of singing and instrumental music; lectures of a useful and practical character; readings, serious or humorous, all gratuitously given. The penny bank continues to take a quiet and important part in the social advancement of the people of the locality. The number of depositors in 1865 was 14,770; in 1866, 15,637. The amount of deposits in 1865, £1,975 9s. 8½d.; and in 1866, £2,205 14s. 4½d. There are 107 classes, taught by 19 paid and 15 voluntary teachers. Many of those who take part in the instruction of the pupils are professional teachers of long standing. As a whole, the Committee consider that this is the most valuable department of the Institution. Besides the primary elements of instruction, reading, writing, and arithmetic, the pupils have the opportunity of learning the elements of geography, grammar, history, arithmetic, algebra, and bookkeeping. The most popular subjects are writing and arithmetic. For many years the absense of punctuality in the attendance of the boys has been a source of deep regret. In September, 1866, the Committee, in order to induce the boys to attend the classes regularly, determined to present prizes to all the junior pupils who should attend punctually seventy nights during six months, and have given satisfaction to the teachers during that period, and to those who attend eighty-five nights punctually a superior prize. The success of the scheme bids fair to exceed the highest expectations. Since its commencement, the weekly average attendance has been 1,619; while for the same time last year the weekly average attendance was 1,098. This greatly increased attendance has necessitated the fitting up of two additional class-rooms for the junior pupils. The Committee, mindful of the distances many of the pupils had to walk to reach the Institution, and the early hour at which all the operative class must be astir in the morning, determined on closing the class-rooms half an hour earlier—at nine o'clock, instead of at half-past nine. It is hoped that the change will lead to more concentrated work in the classes. The drawing classes are open every night. The course of study is drawing and shading from copies, mechanical drawing, linear and practical geometry. A water-colour drawing class is held on Saturday afternoons, which is well attended. The chemical classes continue to flourish. At the examinations connected with the Department of Science and Art several prizes were taken by the students. The utility and importance of the loom class appear to be fully appreciated. The room is nearly always filled with earnest students, anxious to acquire a practical knowledge suited to the trade of the district. The book-keeping class is very popular, but the French class was not so numerously attended during the summer months. In order to make the class somewhat more attractive, a French conversation class was commenced, and is held every Wednesday evening, free of charge to all the pupils of the general class. In August last year an excursion to Wharncliffe-rocks took place, when about 600 members and friends were present. The Secretary of State for India has presented to the Institution one of the sets of eighteen volumes containing specimens of the cotton, silk, and woollen textile fabrics of native Indian manufacture. Only thirteen sets were distributed in Great Britain. The Committee have provided for easy access to it on the part of all persons practically interested in its inspection. The receipts have been £866 18s. 5d.; and there is a balance in hand of £15 5s. 2d.

EXAMINATION PAPERS, 1867.

The following are the Examination papers set in the various subjects at the Final Examination held in April last:—

(*Concluded from page* 686.)

GEOMETRICAL DRAWING.

THREE HOURS ALLOWED.

I.

1. Construct a six-sided figure, A B C . . . . A (O being a point within it) from the following conditions:—

Sides, &c.		Angles.		
O A = 2 inches	State the length of the sides, B C, D E, A F.	A O B =	50°	State the magnitude of the angles B O C, F O A.
O C = 1·65 ,,		B A O =	70°	
C D = 1·8 ,,		B C O =	90°	
O E = 1·8 ,,		C O D =	60°	
O F = 1·65 ,,		D O E =	90°	
		E O F = A O F		

2. On one side of a given line, A B, of 1·5 inches, construct an equilateral triangle, a pentagon, and a heptagon. On the other side of the same line construct a square, a hexagon, and octagon.

3. Describe a circle of 1·25 inches radius, and outside of it six equal circles, each touching the first and the two adjacent circles.

II.

Divide a line A B, 3·75 inches long, into segments, with the following conditions:—

1. In a point C, so that A B · B C = 3 square inches.

2. Either internally or externally in C, so that A B · B C = A C² or A C · B C = A B².

3. In two points C, D, so that A C · B D = A B · C D, A C being assumed at pleasure.

III.

Construct a triangle from the following conditions:—

1. The sum of the sides (perimeter) = 8 inches, and its angles, 40°, 60°, 80°.

2. Its sides in the ratio 2 : 2·5 : 3, and its area 5 square inches.

3. Its sides as 3 : 4 : 5, and the radius of the circumscribing circle 1·5 inches.

IV.

A triangle has its sides 3, 3·5, 4 inches.

1. Construct a square equal to this triangle in area.

2. Construct a rectangle equal to it in area, but the ratio of the sides as 2 : 3.

3. Bisect this triangle by a line parallel to the shortest side.

V.

A circle of 1 inch radius and a line 2 inches from its centre being given—

1. Describe a circle of 1 inch radius to touch both.
2. Describe a circle to touch both, but the *line* in a point 3 inches from the centre of the given circle.
3. Describe a circle to touch both, but to touch the given *circle* in a point 2·25 inches from the line.

Solid Geometry.

VI.

A square A B C D, of 2 inches side, is to be represented in plan and elevation from the following conditions:—

1. When three of its corners are 1, 1·5, 2·5 inches above the paper.
2. When its plane is inclined at 50° and the side A B is inclined at 20°.
3. When its two diagonals are inclined at 20° and 35°.

(In each case the "ground line" of the elevation to be taken parallel to the shortest side of the plan.)

VII.

A prism four inches long, with a pentagon A B C D E of 1 inch side for its base, is to be represented by a plan and elevation from the following conditions:—

1. When its long edges are inclined at 55° to the paper and one side A B of its base is inclined at 20°.
2. When a line drawn from one corner A of one end to the opposite corner D of the other pentagon is either vertical or horizontal.
3. When the solid is suspended in the air by the corner A.

(In the 1st and 2nd cases the "ground line" of the elevation to be taken parallel to the plan of that line the position of which is given in the question.)

VIII.

A pyramid of the same height, and with a similar base to that of the preceding prism, is to be represented in plan and elevation from the following conditions:—

1. When one long edge is either vertical or horizontal.
2. When the solid is suspended from one corner A of the base.
3. The top of the pyramid being cut off by a plane bisecting one long edge at right angles, the bottom frustum to be represented when resting on the section.

IX.

A cylinder and a cone, each four inches high, their bases being circles of one inch radius, and a sphere of one inch radius, are to be represented, by plan and elevation, in one of the following positions:—

1. The cone standing on its base, the cylinder lying on its side, and the sphere also resting on the paper, each solid touching the other two.
2. The cone lying on its slant side, the cylinder standing on its base, and touching the cone in a point halfway between the vertex and the base.
3. The cone lying on its slant side, the sphere also resting on the paper and touching the cone in any point at pleasure.

X.

1. A sphere of 1·25 inches radius has its centre three inches above the paper. Determine its shadow on the horizontal plane when the light is inclined at 60°.
2. The cone of the preceding questions, lying on its side on the paper; determine a plane tangential to its surface, but inclined at 60°.
3. The axis of the cylinder being inclined at 35°, determine by its plan and elevation a line inclined to the paper at 60°, and touching the surface in one point.

N.B.—To entitle the candidate to a first-class certificate, he must construct two at least of the questions of the Solid Geometry.

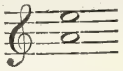
THEORY OF MUSIC.

THREE HOURS ALLOWED.

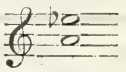
Rudiments of Musical Grammar.

(*Nos.* 5, 6, 7, *and* 8 *must be answered on music paper.*)

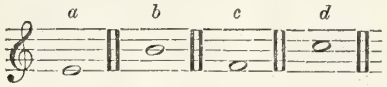
1. In what scales is the following?
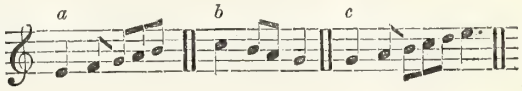


2. In what major scale only is the following? and why?



3. Explain the following words—*syncopation, inversion, transposition.*
4. What is meant by a chromatic scale?
5. Add a major second to *a*, a major third to *b*, a perfect fourth to *c*, and an imperfect fifth to *d*.



6. Write the scale of *Sol* (G) minor in every form with which you are acquainted.
7. Put time signatures to the following:—

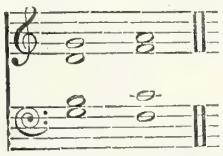


8. Give an example of an augmented second, of a diminished third, a diminished fourth, an augmented fifth, an augmented sixth, and a diminished seventh.
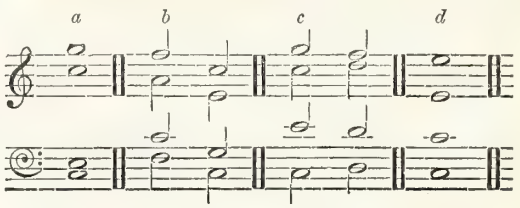
Harmony, Counterpoint, and Musical History.

(*Nos.* 6, 7, *and* 8 *must be answered on music paper.*)
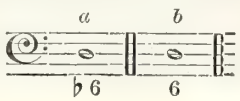
1. What objection is there to the use of the 7th of a major scale as a root, and under what circumstances can it be so used?
2. Give a reason, founded on the laws of harmony, for the elevation, by a semitone, of the 7th of a minor scale.
3. What objection is there to the following progression, and what are the difficulties attending the arrangement of the accompanying parts?
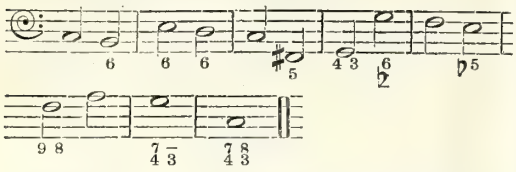


4. Point out the errors or imperfections in the following:—



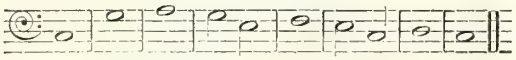
5. What are the roots of the following?



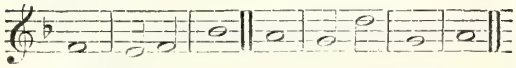
6. Add three parts to the following:—



7. Add a part, or parts, in any kind of counterpoint, to the following:—



8. Harmonize the following:—



9. Who were the principal English composers of the reign of Charles II.? State anything that you know about them.

PARIS EXHIBITION.

Now that the last month of the exhibition is begun, and doubtless many visitors will cross the channel, it will be well to give, not a complete account, for that would be impossible, but a sketch of some of the most salient points in the foreign sections. The group of applied art, or, to quote the terms of the classification, of "the material and applications of the liberal arts," presents perhaps the most interest for the readers of the *Journal*. France makes a magnificent show in this group; the two exhibits which preface it in the grand vestibule are both essentially typical of her progress in the most important of all the divisions of the group. One consists of a collection of the works issued by the great publishing firm of Hachette and Co., the other of the printed productions of Messrs. Maine et Fils, of Tours. The former firm issues the largest number of works of any house in France; the latter, perhaps the finest specimens of printing, and especially of large books and illustrated works. The beauty of the typography alone demands great attention, while the richness of illustration shows the great progress that has been made in this respect. In one case as in the other the prolific genius of Gustave Doré is everywhere apparent; but he is not alone, and the style of illustration generally exhibits a notable advance since 1855. Behind these two collections are two grand compartments, which, together with the avenue between them, are filled with a mass of prints, chromo-lithographs, and illustrated books, most of them of admirable execution; the number of illustrated works of science, technical as well as popular, is surprising. The collections of stationery, and of artists' materials and office requisites, are very large, and show as much progress as the typographical department.

One of the most remarkable collections, however, is that of designs, sketches, and models for manufactures. Here our neighbours exhibit an amount of ingenuity which is unrivalled; and if the taste is not always severe, at any rate it is almost universally agreeable. In the designs we find a large number of copies of Chinese and Japanese work, but, generally, they are adaptations, and not mere copies, and exhibit a remarkable amount of artistic ingenuity. Amongst the designs and models are many finished works; and a collection of decorated faïences by Messrs. Collinot deserves special notice; it consists of a pavilion formed entirely of ornamental glazed pottery, paved with encaustic tiles, and filled with fine pieces of decorated ware, large and small, and admirable in body, glaze, and colour. The scientific section which adjoins the preceding is scarcely less important, with this exception, that it contains many contributions which were exhibited in 1855, and which are therefore really out of date here; but the collection of scientific and philosophical instruments headed by Ruhmkorff, and of microscopic preparations and anatomical models, is magnificent. The collection of musical instruments opposite the two *salles* above-named, and that of surgical instruments and medical and sanitary apparatus beyond, are both of them unequalled whether in extent or importance. The last department of this group is occupied by the materials of education, also an admirable show, but, unlike the others, crowded and ill-lighted.

The other states follow in order around the circle of the building, and all, or nearly all, show good educational collections, musical instruments, photographs, and stationery. Hesse, Baden, Wurtemburg, and Bavaria are remarkable for their collections of drawing and mechanical models.

Austria makes a good show in nearly all the sections of this group, but especially for geological maps and books, charts, and collections for general and technical education.

Greece emulates England, and exhibits copies of her newspapers and periodical journals, amounting to just 100 in number.

Russia here, as elsewhere, takes a highly honourable place; she has a fine collection of photographs, representing public buildings, and a most interesting series of views in the Caucasian mountains; a very remarkable series of figures of peasants and others, and also of animals in terra cotta; a good collection of surgical instruments; and also of stationery, plain and decorative.

Italy exhibits in this group one of the most important inventions in the Exhibition, that of M. Brunetti, for preserving animal tissues, to which a grand prize has been awarded; healthy and diseased lungs, and other parts of the body are exhibited in a dried form, and but little shrivelled, with the appearance of paper pulp or leather, and of a consistency permitting it to be dissected in any manner with ease, and even cut into the thinnest laminæ for microscopic examination or exhibition. She has also a good show of educational books, models, and collections of photographs, including enamelled specimens.

In the United States section are several pianos of excellent quality, and cabinet organs; books, maps, and photographs. South America, India, Canada, and the other British colonies, all exhibit photographs; many, being views of local scenery, are highly interesting.

Great Britain completes the group with the finest collection of periodical and other printed works in the Exhibition, not perhaps in an artistic, but in a social, moral, and commercial point of view; if some finer specimens of typography can be shown by other countries, no state could exhibit such a mass of healthy, sound, well-printed literature, produced within the short period of twelve months. The English portion of this group includes admirable examples of the application of art to the decoration of ceramic and metal work, and although we cannot claim to be first in ornamental art, we may well congratulate ourselves on the progress which we have made since the great display in 1851 taught us our deficiencies.

THE LAMBETH LIBRARY.

The following letters have been addressed to the editor of *The Times*:—

Sir,—A short time ago you suggested that the Lambeth library, abandoned by the Archbishop of Canterbury and starved by the Ecclesiastical Commissioners, should be transferred to the British Museum, and your suggestion has been generally echoed by the press. But before it is adopted allow me to make another one, which is that the library be made a public one for that part of the metropolis.

Paris has its four public libraries supported by the State, besides the Bibliotheque Impériale. Then there is the library of the Hotel de Ville, with its 70,000 volumes of the histories of French towns; the Arsenal library, with its 6,000 MS. and 200,000 volumes of early poets and Italian literature; the library of the Conservatoire des Arts et Metiers, with its 20,000 volumes on science and art; the St. Geneviève library, with its 180,000 volumes of divinity, classics, &c. In all, there are upwards of 18 public libraries in Paris, all accessible to every student, whereas London, with its greater extent and population, has only the British Museum and the Educational Library at South Kensington to which the public has a right of access.

Let us have a public library at Lambeth based upon the existing one, the oldest public library, it is said, in England, hallowed with innumerable associations. There are already on the spot the books and manuscripts; the Ecclesiastical Commissioners offer £150 a year, which could, perhaps, be augmented; Parliament, which would have to pay something for the transfer to the British Museum, might make its annual contribution; and Lambeth itself, through the Public Libraries Act, might raise a rate of a half-penny in the pound, like Manchester, Birmingham, &c., and thus would be provided a sufficient sum for management and increase, and a great public good effected.

There is Nixon's noble dining-room waiting for a reading-room, and there are the gardens for a public promenade when the Archbishop is out of town. If we allow the books to be sent away, the old historical buildings and their associations will soon be swept away and the ground leased on building leases for 99 years. It would be a sacrilegious act, which I believe even household suffrage is too conservative to permit, but if allowed would lead, I believe, to abolishing the Archbishop of Canterbury himself.—I am, &c.,

Henry Cole.

Paris, September 24.

Sir,—Every one who is acquainted with the constitution and peculiar character of the Lambeth Library, or has seen the two catalogues of the more interesting portions of it, printed by that profound scholar and excellent man, Dr. Maitland, who was for so many years the keeper of that library and the friend of Archbishop Howley, must agree with Mr. Cole in deprecating its removal to the British Museum, and in advocating its preservation as a separate library.

There is a homely English proverb, full of practical wisdom, which bids us "Not to put all our eggs in the same basket." It is one which we should do well to bear in mind on the present occasion.

Inflammatory as may be the subject of many books, books themselves, fortunately, do not readily consume. Yet who can contemplate without a shudder the possibility of a fire breaking out in our great National Library; and who would not, in the face of so great a calamity, which Heaven forefend, rejoice that the Lambeth Library had not added to such a holocaust?

But, agreeing with Mr. Cole that the library should not be removed, I cannot agree with him in intrusting it to the halfpenny rate-payers of Lambeth, and so, perchance, making its maintenance the subject of a party vote, and its dispersion the consequence of some ultra-radical majority.

Did the parish of St. Martin come forward with a halfpenny rate to save Archbishop Tenison's Library? Does my memory mislead me, or am I right in believing that in one of the north-western parishes of the metropolis a library which had been collected by a rate, by subscriptions, by contributions from learned societies and men of letters, and by the liberality of some of our great publishers, was eventually sold, because a rate for its maintenance could not be carried?

Lambeth Library ought to be preserved, not only as an additional library in the metropolis, but as a monument of the liberality of the prelates by whom it was founded, and of the learning of the Whartons and Maitlands to whose custody it has been intrusted; and it ought to be maintained by a Parliamentary grant. A thousand a year would cover—I believe, more than cover—all the necessary expenses, including the binding and repair of the books and the salary of the librarian. The librarianship would be a literary Blue Riband for one of those ripe and good scholars of which our Church can boast so many, the recent holder of that office being, of course, its first recipient.

What Chancellor of the Exchequer would hesitate to propose, what House of Commons, reformed or unreformed, would hesitate to vote, that sum for the maintenance in the beautiful hall, which the munificence of Dr. Howley fitted up for its reception, of a library as unique in its character as it is rich in its contents?

I am, &c.,

William J. Thoms.

Sir,—Mr. Thoms's concurrence in my suggestion to preserve Lambeth Library on its present site is satisfactory as coming from such a scholar and archæologist. But in ascribing to me a notion of intrusting it to all the accidents of parochial management he has misunderstood my letter. If the Ecclesiastical Commissioners and Parliament respectively contributed portions of the funds, I think it may be assumed that some proper public responsibility would be established for the administration of them. The parish of Lambeth might come in aid with funds to provide for additions, and to secure the general throwing open of the library and its use by the parishioners. If Lambeth be not advanced enough to do this, *cadit quæstio*, so far as it is concerned. The public moral obligation of preserving and utilising this, the oldest library in London, remains just the same on the Ecclesiastical Commissioners, on the Archbishop of Canterbury, and, I hope it will be admitted, on Parliament. I venture to hope that the present Archbishop will, in respect of this venerable institution, prove himself to be a worthy successor of Archbishop Juxon.

I am, &c.,

Henry Cole.

Oct. 1, 1867.

BRITISH ASSOCIATION, 1867.

The Iron Shipbuilding of Dundee.

Mr. Henry Gourlay read the following paper on this subject:—

Shipbuilding has long been an important branch of industry in Dundee, and even at the beginning of the present century the number of vessels built for coasting and over-sea trade was considerable. All these vessels were, of course, built of timber, and about the year 1823 were all propelled by sails. The number and size of the vessels gradually increased, until about the year 1856, when wooden shipbuilding in Dundee may be said to have reached its maximum. In that year Messrs. Alexander Stephen and Son built the *Eastern Monarch*. This vessel measured 1,848 tons, B.M., was classed 14 years A1 in Lloyds' Register, and at the time was one of the largest, if not the largest, vessel afloat of this high class. At this time there were six firms which built timber vessels, whereas at present there are only two which do so exclusively, one other firm building timber and composite vessels. There is also a considerable number of wooden vessels built on the Tay at Perth, Newburgh, and Tayport. It is now nearly thirty years since iron shipbuilding was introduced in Dundee. In the year 1838 Messrs. James Carmichael and Co. built an iron paddle steamer (for, as we shall immediately see, steam shipbuilding had been commenced some time prior to this). This vessel was named the *Caledonia*, and was intended for the river traffic between Dundee and Perth. The same firm also built a small iron schooner. These

vessels attracted considerable attention at the time, there being very few iron vessels then afloat. After building these two vessels, Messrs. Carmichael discontinued iron shipbuilding, but it was again taken up in 1840 by Mr. Peter Borrie, who built several iron paddle steamers. Unfortunately, Mr. Borrie was not commercially successful, and so was compelled to abandon the trade. Between the years 1842 and 1854, no iron ships were built in Dundee, and during this interval other ports had commenced, and were carrying on the trade with vigour, so that, although Dundee was early in the field, this advantage was lost.

In 1854, Messrs. Gourlay, Brothers, and Co., commenced to build vessels of iron, and since that time the trade has steadily increased, there being now two firms which build entirely with iron, and one which uses iron for the frame-work. The largest iron vessel yet built in Dundee is named the *Dundee*, and measures 1,295 tons register. It was built by Messrs. Gourlay, Brothers, and Co., is owned by Messrs. Gilroy, Brothers, and Co., of this town, and is employed to carry jute from Calcutta.

As a proof of the severe treatment which iron vessels are capable of sustaining, without permanent injury, the following facts may be here mentioned:—On the 18th November, 1865, the screw steamer *London* was proceeding down the river Tay when she was run into and cut down to the bilge by the steamer *Harvest Queen*. The opening made in the *London's* side was about twelve feet long at the gunwale, and tapered gradually down to the bilge—the gunwale and 'tween deck stringers being entirely carried away. In about a quarter of an hour the vessel sank in deep water, where only a small portion of her deck forward was dry at low water in spring-tides. In this position she remained for twelve months, during which time she endured the violence of several severe storms. The gap in the *London's* side was about fifty feet from the stern, and nearly the whole of this length was unsupported — the vessel resting amidships on a hard bottom, so that she lay for twelve months exposed to the fury of the sea, with nearly fifty feet of her stern overhanging, and this with only one side of the vessel left entire. The *London* was raised last December by her builders, and is now in as seaworthy a condition as the day she was launched. The *Harvest Queen* struck the *London* with her stern, and was consequently not so much injured; but she had to be run ashore on bad ground, and, being heavily laden with coal, she parted amidships when the tide left her; however, she was raised by Mr. Petrie, of Newport, and is now also as seaworthy as ever.

Steam shipbuilding has also been long carried on in Dundee. We find that in 1823 there was a paddle vessel, named the *Hero*, built for the passenger traffic between Dundee and Perth; and in 1834 Mr. Thomas Adamson, in conjunction with Mr. Peter Borrie, energetically took up this branch of the trade, and built a number of paddle steamers, one of which was the unfortunate *Forfarshire*, that was lost on the Fern Islands, and to save whose passengers Grace Darling made her heroic efforts. All these steamers were built of timber; but in the year 1840 Mr. Borrie, as has been already mentioned, commenced to construct iron steamers. The first screw steamer built in Dundee was launched from the building-yard of Mr. John Brown, in 1851. This vessel, named the *Correo*, measured 395 tons B.M., and was fitted with a pair of geared engines of 70-horse power. After Mr. Borrie gave up business, steam shipbuilding was not carried on to any great extent until the year 1854, when it was again revived by Messrs. Gourlay, Brothers, who have carried it on since that time, and have turned out a large number of steamers, many of which have been vessels of considerable value, fitted for carrying mails and passengers, and such have been supplied to several of the leading steamship companies.

About ten years ago, a sailing vessel named the *Tay* was fitted with a pair of screw engines, and sent to the whale fishing—her owners thinking that the aid of steam would be a great advantage. Their anticipations proved to be correct, and the following year there were two screw whalers built specially for the trade; since that time a great number of such vessels have been turned out by Messrs. Alexander Stephen and Sons, both for this and other ports. The employment of sailing vessels for the seal and whale fishing has now been entirely abandoned in Dundee. These screw whalers have all been built of timber, and are strongly fortified to enable them to endure the severe pressure of ice to which they are often exposed; they are only fitted with auxiliary power, and are fully rigged for sailing. A difference of opinion prevails as to whether iron is a suitable material for building vessels intended for this trade. It is urged, on the one hand, that iron vessels have been already tried, and found to be unreliable amongst ice; that iron is untrustworthy when exposed to low temperatures, especially when it has to endure the impact of masses of ice. On the other hand, it is asserted that the iron vessels which were sent to the fishery some years ago were not built for the trade, and were quite unsuitable for it; that a good quality of iron is little affected by low temperatures; and that, by adding slightly to the thickness of the plating, the strength of the vessel to resist the impact of ice may be greatly increased; and that, as whaling vessels are supplied with large tanks to contain the cargo of oil, these tanks may be fitted to form independent compartments, so that if a piece of the ice should penetrate the iron skin, the result will merely be that one of the tanks will be filled with water.

Until the year 1865 all the vessels built in Dundee had been constructed either of wood or iron, but at this time Messrs. Stephen commenced to build ships with a combination of these materials. Such vessels are known as composite, and, as built by Messrs. Stephen, are classed 15 years A 1 in Lloyd's register. The frames, keelson, stringers, tie-plates, and beams are of iron, and the planking, keel, stem and stern post, are of timber. The planking is secured to the frames with yellow metal bolts, and is also sheathed with yellow metal, the same as wooden vessels, so that such vessels do not foul, as iron ones are apt to do, on long voyages. Shipbuilding in all its branches is at present in a rather depressed condition in Dundee, as indeed it is all over the world; but this state of things is only temporary, and the trade will no doubt soon revive.

In order to give a correct idea of the shipbuilding carried on in Dundee, I will show what tonnage has been built during the last six years by the five firms now engaged in it, and shortly describe what each firm has done. Messrs. Alex. Stephen and Son build composite and wooden vessels; the composite ships are generally of considerable tonnage, varying from 600 to 1,250 tons B.M.; the wooden vessels built by this firm have of late years been nearly confined to screw whalers. Messrs. Stephen, since January, 1861, have launched 3,272 tons of wooden sailing vessels; 5,621 tons of screw whalers, fitted with 600 horse-power; 1,847 tons of composite sailing ships; and have on the stocks one screw whaler of 520 tons, and one composite sailing ship of 601 tons B.M.—in all, 11,861 tons B.M., and 600 horse-power. The average number of hands employed by this firm is about 220. Messrs. Brown and Simpson are now principally engaged in building iron vessels. Before 1865 Mr. Brown built wooden vessels, and altogether there have been launched since 1861, 2,551 tons of wooden sailing ships; 2,491 tons of iron sailing ships; and 63 tons of iron steamers; and there is on hand 1,066 tons of iron sailing vessels—in all, 6,108 tons. The number of men employed is about 200. The Tay Shipbuilding Company build wooden vessels, and since 1861 have launched 4,502 of such, and have on the stocks one vessel of 350 tons—in all, 4,852 tons. The number of men employed is about one hundred and twenty. The Dundee Shipbuilding Company also build wooden vessels. They

have launched 3,348 tons since 1861, and have one vessel of 398 tons on hand; build vessels up to 610 tons. The average number of men employed is about seventy. Messrs. Gourlay, Brothers, and Co. build iron vessels. They have been principally engaged in building steamers, and since January, 1861, have launched 2,511 tons of sailing vessels; 11,293 tons of iron steamers, fitted with 2,480 horse-power; and have on hand two steamers measuring 1,130 tons collectively—total tonnage, 14,934 tons. The average number of men employed in the building yard is about 300. The following table will show the tonnage of the various kinds of vessels that have been launched in Dundee since the year 1861, and also the tonnage on the stocks in June of this year:—

Wooden sailing vessels launched since 1861	13,673		
On the stocks, June, 1867.....	748		
		14,421	
Wooden steamers launched since 1861	5,621		
On the stocks, June, 1867.....	520		
		6,141	
Total tonnage of wooden vessels			20,562
Iron sailing vessels launched since 1861	5,002		
On the stocks, June, 1867.....	1,066		
		6,068	
Iron steamers launched since 1861	11,356		
On the stocks, June, 1867.....	1,130		
		12,486	
Total tonnage of iron vessels ..			18,554
Composite sailing vessels launched since 1861	1,847		
On the stocks, June, 1867.....	601		
		2,448	
Total tonnage of composite vessels			2,448
Total tons			41,564

The value of the vessels represented by this tonnage is about £627,000 sterling, or £104,500 annually, exclusive of the machinery fitted on board the steamers. The average number of men and boys employed in the shipbuilding yards is about 910. The materials of which the vessels are constructed are generally brought from a distance. The iron comes from the north of England and Glasgow; the wood—except the oak, which is grown in the neighbourhood—from the Baltic, America, and India. The chains and anchors are generally manufactured in Newcastle, but the sailcloth and cordage are produced in Dundee. The cost of the carriage of iron and coal is a disadvantage that the Dundee shipbuilder labours under; but it is not a very serious obstacle, as these materials can be carried at a cheaper rate by water, and there are advantages to compensate, so that there is no reason why shipbuilding may not be largely carried on in Dundee. Iron as a material for shipbuilding is here, as elsewhere, to a large extent taking the place of wood, for I find that in 1853 there were no iron ships building in Dundee, but for the last six years the tonnage of the iron vessels has not been far short of the wooden ones, whilst there is nearly double the tonnage of iron vessels on hand than there is of wooden ones.

TECHNICAL EDUCATION.—HOROLOGICAL SCHOOLS IN FRANCE.

A few years ago the watch and clock trade in France had fallen to a low ebb; the home production was small, and the importation considerable; great efforts have, however, been made at Besançon, and all along the Swiss frontier, in the arrondissements of Moreau and Pontarlier, the district of Montbéliard, and the mountains of the Doubs. Large factories in the two latter districts are employed in the making of detached pieces of the mechanism only. The number of watches produced at Besançon is about 300,000 a year, gold and silver; this is equal to about four-fifths of the whole consumption of France. The Besançon trade has increased very rapidly; in 1845 the total make was just over 54,000; in 1855 it had risen to 142,000; and in 1865 it was just under 300,000. The effect of this increased activity is shown in the imports, which have declined in the same proportion as the home manufacture has increased; in 1855 the number of watches received from abroad was 200,000, but in 1865 it had fallen to 45,454. There exists at Besançon a school of horology, towards the expenses of which the municipal authorities subscribe £800 a year. Another school was established in the year 1863-4 at Cluses, in the arrondissement of Bonneville, on the road from Geneva to Chamounix. The object of this school, as stated in the Imperial decree, is to form educated and able workmen for the different branches of the trade, and to secure the necessary instruction for those who intend to become manufacturers, finishers, or repairers. The course of instruction must not exceed three years, and the teaching, which is theoretical as well as practical, is gratuitous. The theoretical instruction includes French grammar, writing, mechanical drawing, arithmetic, geometry, and the elements of algebra, physics, and cosmography. The practical instruction is given in four workshops, devoted severally to the making of the various parts, in the rough-cutting pinions, making dials and finishing the various kinds of escapements, putting together, casing and regulating, and, lastly, accessory operations, such as wheel-cutting, jewelling, and case making and finishing.

The lads are boarded out of doors, but under the surveillance of the school, and the cost, including board, lodging, and washing, is £21 per annum, paid quarterly in advance. A portion of the pupils are maintained by the state and by the local authorities, the rest by their own families. Each pupil has to deposit the sum of one pound to defray any loss of materials which may occur by his own fault.

The director, with the advice of a council, gives a certificate to each pupil who deserves one, indicating the degree of his proficiency, and stating the special operations to which he has devoted himself while in the school.

Boys are not admitted until they have passed the age of fourteen, but no maximum seems to be fixed in this respect. Each pupil is required to be able to read, write, and cypher, and know something of the metrical system of weights and measures, before admission; and all candidates are examined by a schoolmaster appointed by the sub-prefect of the place to which he belongs; the list of those who have passed their examination is placed in the hands of the prefect, who nominates those who are to enter the school.

In the school the pupils wear a grey linen blouse, and out of doors either that or a blue tunic, like the pupils of the Paris schools, with a uniform *kepi*. Each pupil has to find his own books and tools; the list of the latter, however, is not long—a turning tool, pair of pliers, compasses, calipers, hammer, oilstone, blow-pipe, two gravers, half-a-dozen files, and two whalebone bows, with a dozen gut strings. A collection of finished watches, movements, and detached pieces produced at the school may be seen at the Paris Exhibition.

Manufactures.

Improvements in Railway Carriages.—The French railway companies are making considerable improvements in their carriages. The Paris, Lyons, and Mediterranean line has just put to work a very large number of first-class carriages, six hundred it is said, of an improved model; these carriages are larger and more comfortable than usual, and the company has very considerately had the arms which divide the places made

so that they may be easily removed, and thus allow passengers to lie at full length upon the seats when the carriages are not too full. The Eastern line has done what was still more desirable—namely, started a number of third-class carriages on an improved model; they are much better ventilated than the old ones, and the seats are divided by arms; unfortunately, however, as these arms are fixed, the third-class passengers of the Eastern Company will now be deprived of the chance of the recumbent stretch which they had before. A shed in the French quarter of the grounds of the Paris Exhibition contains an admirable collection, not only of railway carriages, but all kinds of fittings and materials for the same, and well deserves a visit.

Paper Manufacture in Russia.—This industry is being very rapidly developed in Russia. In 1845 there were only 158 paper mills, producing paper to the value of £450,000. In 1864 there were 184 mills, with 13,000 workmen, and their production was returned at the value of £900,000. There are paper manufactories in all the governments of the empire except Archangel, Astrakan, Vitepsk, Grodno, Kovno, Minsk, Voronege, Ssaratoff, Poltawa, Kherson, Yethakerinoslan, Bessarabia, and the Tauride. The government of St. Petersburg stands at the head of the manufacture, having 30 mills and 2,200 workmen, producing one-third of the whole quantity made in the empire. Moscow comes next with 24 mills; Skalonga and Viatka next with 15 and 11 respectively.

Manufactures in Norway.—The spinning mills and manufactories of woven goods employ about 2,500 workmen. Sixteen mills prepare about 2,000,000 kilogrammes of cotton yarn, and there are 11 manufactories of cottons, 3 of sail-cloths, and 3 of woollen cloths; the last work up 440,000 lbs. of wool annually. There are in Norway 44 rope yards, employing 360 workmen; 78 tobacco manufactories, employing 800 workmen, and exporting 5,300 lbs. of manufactured tobacco; 3 establishments for making matches; 328 tile-making works, employing 2,080 workmen, and producing annually 40,000,000 tiles and bricks; 25 machine works, occupying 1,250 workmen; 3 large and 4 small paper mills, with 200 workmen, producing about 550,000 lbs. of paper of all kinds; 8 manufactories of pianos, which turn out 150 instruments a year; 6 glass-works, employing about 300 workmen; and 6 establishments for wood distillation; about $7\frac{1}{5}$ millions of litres of spirits are made, employing 800 workmen; 96 breweries, with 616 workmen, furnish for export annually 100 hectolitres of beer, sent specially to Sweden, Denmark, and Hamburg; 5 million kilogrammes of barley are yearly made into malt. The tanneries produce 2,800,000 lbs. of leather.

Commerce.

Trade of the Sandwich Islands.—Among the articles exported from these islands in 1866 were:—Sugar, from the port of Honolulu, 17,729,161 lbs.; molasses, 851,795 gallons; flour, rice, 438,367 lbs.; coffee, 93,682 lbs., against 263,705 lbs. in 1865; salt, 738 tons; cotton, 22,289 lbs.; goat skins, 76,115 bales, against 144,085 bales in 1865; leather, 282,305 lbs.; tallow, 159,731 lbs.; whale oil, 91,182 gallons; whalebone, 56,840 lbs. Other articles, such as silk, mats, wood for cabinet work, &c., also furnish articles of exportation. Among other articles of commerce, the silky fibres of a fern, under the name of "pulu," are shipped to California to the amount of 212,026 lbs. The line of steamers between China and San Francisco touches at Honolulu, and Hawaiian vessels carry on a regular service with Bremen.

Agricultural Prospects in Italy.—The vintage in Southern Italy is by this time about finished, and was begun at least ten days earlier than usual, in consequence of the extreme dryness of the season, which has burnt the grapes in many places. In Sicily and the Neapolitan provinces the new wine is not only abundant but contains an unusual amount of spirit. In Tuscany the grapes are not quite so plentiful as in the south, but on the other hand they are not so much scorched. In Piedmont and the provinces of the Emilia the vintage is most satisfactory; the rice also promises to yield a most abundant harvest. The cotton crops are not very promising, excepting those where there is a plentiful supply and a good system of irrigation. Cattle are scarce, partly owing to the scarcity of grain from want of irrigation, and partly to exportation, which has almost occasioned uneasiness in Northern Italy; on the other hand, the epizoozia has destroyed a good many in Sicily and in the Neapolitan provinces. An abundant crop of olives is expected. In general the harvest has been good, as is proved by the prices of cereals.

Colonies.

Natal Coal and Iron.—The *Natal Mercury* makes the following observations:—"It is to be hoped that the colonists will not allow the question of coal-development to sleep. Coal and iron are, notoriously, the most certain staple of a country's prosperity. They have carved out a position of commercial pre-eminence for Great Britain, and so completely do the advanced statesmen of the day recognise them as the primary sources of her national greatness, that her decadence is pre-dated from the time when her coal measures become exhausted. The possession of these motive powers of industry makes America independent of the world. Coal supplies the heat by which iron can be manipulated into countless forms of utility and ornament. Energetically turned to account, they can hardly fail to secure wealth and prosperity. To men whose lives have been spent in the manufacturing districts of England, and who have day by day seen around them the wonders wrought, not only industrially, but socially, by means of coal and iron, the apparent apathy existing here, in regard to these two resources, is incomprehensible. Here, say they, you have within your grasp the sources of wealth; here is abundant scope for the employment of industry, and yet you repine about your poverty, and cry out for work. To such persons no effort would be too great—no measure too bold—in order to turn these elements to valuable account. They deride the prudent objections of those who urge the rashness, if not the folly, of incurring heavy liabilities in the shape of capital borrowed to work the enterprise. If coal and iron abound, as they are said to do, the speculation is simply the soundest form of investment. You have a vast market for your supplies. India, Mauritius, and Aden, would find at your port the nearest source of supply. Nor is this all. Were coal obtainable at cheap rates here, a change would be created in maritime commerce. Large steamers would be constructed to round the Cape, and to coal here, and the costly and troublesome overland route would be partially abandoned in favour of the old course of trade. Steamvessels, moreover, are coming into fashion even for long sea routes in preference to sailing ships, as carriers of cargo. Two or three lines now ply to China, and call at Mauritius; sometimes at Algoa Bay. Were coal obtainable here, this would be their port of call; while steam traffic would soon engross a large part of the vast East Indian trade. As to a market, therefore, the future is certain. This is the substance of the arguments lately set forth by Mr. Donovan, Dr. Mann, and others, in the columns of English journals, with reference to our coal fields. There is much irresistible truth in them. We are neglecting the right use of the natural agencies conferred upon us by Providence, for the attainment of our true position as a community. While we deplore the misfortunes that beset us, and spend hope after hope in quest of better times, might we not with advantage consider whether by organisation, investigation, or any

other kind of effort, it may not be possible to second the endeavours of people in England, and supply them, at any rate, with better materials of action than what they have now. Government might do its part in obtaining a practical and precise report upon the Newcastle coal measures. But a more immediate line of effectual action lies open to private and interested persons. Why should not the holders of land in those parts, and, indeed, all colonists who would be directly or indirectly benefited by the results of action—and who would not?—combine and subscribe, so as to obtain a large shipment, not less than 100 tons, or, better still, an entire cargo, and send it home as proof positive that the coal is there. The expense would be considerable—perhaps £1,000, but the sale of the coal would partly reimburse the subscribers, while the good done to the colony and to individual interests would be incalculable. Would it not be wise policy on the part of institutions largely interested in landed securities, to liberally aid, if not to initiate, such a movement. Such a shipment as we have indicated would alone enable us to ascertain the market value of our coal deposits, and to arrive at a positive understanding of the quality and kind of the coal." As to the question of iron, the same writer says:—"Native usage and tradition in Africa all point to the feasibility of iron-working being largely carried on here. In Australia the aborigines use spears armed with fish bones. Here, and throughout the continent, spears and other implements made of iron have from time immemorial been in use among the natives. From those savages we may learn wisdom in this matter. Dr. Livingstone says that in Zambesi the tribes can supply themselves with iron more easily than it can be imported. He says "the natives consider English iron rotten, and will not use it. I brought home some of the hoes which Sekeleth gave me to purchase a canoe, and some others obtained in Quillimane, and they had been found of such good quality that a friend of mine in Birmingham has made an Enfield rifle of them." On sending a specimen of this iron to a blacksmith, "he pronounced it strongly like Swedish or Russian, and added that when chilled it had the properties of steel." An equally valuable and high-classed metal is obtained among the Fans on the West Coast, from iron-stone smelted in the rudest manner by wood fuel heaped on to bits of ore, and kept burning for several days. Du Chaillu says that this iron is so tenacious that the natives prefer it to any from Birmingham or America, and by its own excellence it "protects" itself. Indeed, as a rule, we believe that locally manufactured iron would be likely to be more durable than imported, which is too often made bad expressly "for exportation," on the principle that anything will do for the colonies. But whether this be so or not, the folly of neglecting these twin sources of wealth, lying as they do under our feet, cannot be overestimated. Coal and iron will make Natal, and confer upon us prosperity far faster and more effectually—with a more quietly formed solidity, and with less immediate demoralisation—than would all the gold mines of Golconda. In discussing the expediency of forming a railway, let us then bear in mind that such a line would give instant activity to those wonderful but latent resources. What we lack in population is made up by the wide-spread existence of these two levers of progress. For not in Natal merely, but beyond our borders, along the eastern slopes of the northern Drakensberg, and throughout the Transvaal Republic iron almost everywhere, coal frequently, are known to be laid up—as if by Providential design—for the use and enrichment of our enterprising people. It seems as if the destiny marked out for South Africa is, when the times are ripe, and the necessity has matured, to become the iron-foundry and fuel-market of the southern world. Shall we, in the hour of need, grasp this distinction or let it slip?"

Precious Stones at the Cape of Good Hope.—A Cape paper states that people are prospecting in all directions in the neighbourhood of Colesberg in searc of diamonds. A number of those precious stones h already been found, some of them of considerable v The first diamond was picked up by a little girl at H town. Her father is a labourer, on the farm of Schalk van Niekerk. She took the diamond to mother, and the latter, thinking it only a pretty sto returned it to the child to play with. Niekerk happene to see it glitter and offered to buy it of the girl, but she gave it to him, saying, laughingly, who ever heard of selling a stone. He took it, and it proved to be a diamond worth £500. Garnets have just been found in considerable numbers at the Cape. The copper miners in Amapondaland are meeting with much encouragement. Oil stones have just been found in the Ganubie river. Amber has also been found in the Colesberg district, also formations containing phosphorus and quicksilver. It is also reported on good authority that some gentlemen in seeking for diamonds have come upon a lode of silver and lead ore.

Copper in Natal.—An important mineralogical discovery has recently been made in this colony. It may be remembered that the mines at Griqualand owed their discovery to the rude green paint used by the natives in decorating their faces. The attention of Mr. Shepstone, Secretary for Native Affairs, was attracted by this circumstance to a similar incident, noticed by him 18 years ago within the boundaries of Natal. In course of time he succeeded in identifying the exact locality, and Mr. Warne, a practical miner of 30 years' experience, has recently returned from a nine days' prospecting trip, bringing with him about three cwt. of metalliferous rock, consisting chiefly of carbonate of copper mixed with quartz and friable clay. These specimens are poor, being from near the surface, but they give every promise of a richer yield beneath. These are taken from a vein eight feet wide, running from north-east to south-west, and probably extending for some distance, as similar indications have been found at other places. The most important feature of the discovery, however, is its nearness to the coast, the lode not being more than seven miles from the sea, and little more than that distance in the tidal rise of the Umkomazi, where the river becomes navigable and accessible by small vessels. A township has already been laid out at this little harbour, which is only 30 miles south of Durban. The distance of the lode by land is only about 27 miles, 13 of which is a dead level. The land all round is set apart for the use of the natives, and Government will, therefore, have the disposal of the affair in their own hands. In all probability these mineral indications are but precursors of further discoveries. They occur in a range of hills which run parallel with the coast from the Amapondaland, through Natal into Zululand. At the southern extremity copper of fine quality exists, and it is now found at a higher point near the Ilovo. Government has placed £1,000 on the estimates for next year in aid of mineralogical explorations.

Notes.

Price of Land in Paris.—The *Moniteur* gives the following as the price of land for building in several of the new streets of Paris:—Place du Théâtre Français, equal to £48 the square mètre; Rues Turbigo and Réaumur, £34 16s.; Rues Laffitte and St. Georges, £33; Chaussée d'Antin and Rue Ollivier, £28; Rue Lafayette, £42; Rue Taitbout, £40; Rue de Rennes (continued), near Mont Parnasse, £6.

New Method of Horse-shoeing.—The Paris correspondent of the *Telegraph* speaks of a new shoeing process which, he says, is coming into general use there. Instead of the wide and heavy plate hitherto fixed under the horse's foot, M. Charlier, the inventor, fastens a narrow iron band

in a rebate, paired round the lower external rim of the hoof. The latter is thus furnished with a resisting ·der, by which it is protected against wear, allowing ·e same time all the other parts of the sole to keep . natural hold on the ground, and thus to preserve normal form and constitution of the organ. This *plantaire* mode of shoeing, as it is called, is simple ɔugh. The new shoe is about two-thirds lighter than .e old one, which proves a great relief to the animals, ɔesides preserving them from most of the usual diseases and accidents of the foot. M. Charlier says that in the natural state, so long as the side of the hoof does not split, the whole member wears very well; therefore the problem to be solved merely consisted in preventing the hoof from splitting, and in preserving the rest of the foot. So he simply gives it an artificial border, stronger than the natural one, but without compressing or damaging the foot. The new shoe appears to make the horse particularly sure-footed, and to answer as well for large as for small horses. There remains the question of cost. The iron employed must be of the best quality, but as the new shoe requires from a half to two-thirds less material than the old one, it comes to the same. It appears that, after a fair trial, the Voitures de Paris Company have purchased the right of shoeing all their horses on this plan, and it has also been tested by one thousand omnibus horses.

Scholastic Registration Association.—At the last annual meeting of this association it was resolved to make the association the basis of a periodical "Educational Congress," in order to afford educators, and the friends of education generally, the opportunity of exchanging views on questions relating to the educational wants of the country. In pursuance of this resolution, a Congress is announced to be held at Birmingham on Wednesday, the 13th of November, when the following subjects will be discussed:—"How far will the proposed Scholastic Registration Act tend to raise the standard of education throughout the country, and promote the interests and efficiency of the scholastic profession?"—"How far is the science of education capable of development by the more specific training of educators, and by such measures as the institution of a special faculty of education in the universities of Great Britain and Ireland?"—"What means can be adopted for training teachers for upper and middle-class schools?" A large and influential local committee has been formed, including George Dixon, Esq., M.P.; and all those who are interested in the advancement of education and the prosperity of the profession are invited to attend. Full information respecting the proceedings of the congress may be obtained from the hon. secretary, Barrow Rule, Esq., Aldershot.

The City Companies and Technical Education.—In a speech made on the occasion of the recent election of the Lord Mayor, Mr. John Jones, a member of the Livery, said:—"The ancient Livery companies of the city of London might still be made, as of old, germinating centres, and the only proper medium by which improved culture could be given to the artizans of England. Their ancient *prestige* might be revived if the Lord Mayor would but call upon them to act up to their original objects, to see that apprentices in the various handicrafts were well taught, and that the knowledge of discoveries in science and the mechanical arts was well disseminated among the artizans of that great city. For ages in those civic companies there had been arrangements for settling such disputes in trade as had culminated, for the lack of such arrangements, in the revolting disclosures which had been made at Sheffield, and the Lord Mayor for the time being, by putting himself at the head of such a system as was known in France by the name of Conseils des Prud'hommes, might settle the due proportions of labour and capital in their joint action and endeavours whenever those may be in dispute."

Patents.

From Commissioners of Patents' Journal, September 27th.

Grants of Provisional Protection.

Aëronautical apparatus—1982—T. Craddock.
Aëronautical apparatus—2504—J. K. Smythies.
Asthma, &c., preparation for relieving—2524—S. Cassan.
Bale fasteners—2512—L. B. Pothier.
Canisters—2516—J. S. Henderson and J. Macintosh.
Carriages, &c.—2532—J. Cockshoot, jun.
Cartridges—2502—G. W. Howard.
Cask stands—2554—J. Turnock.
Chenille, manufacturing—2590—P. R. Couchoud.
Cigar bunches, pressing and shaping—2514—G. Cope.
Compasses—2592—F. A. Paget.
Corsets—2576—L. M. Prewitt.
Engraving machine—2218—W. Snell.
Fabrics and yarns, finishing—2490—A. Leigh.
Faggots—2620—T. Stevenson.
Filters—2564—J. Rae.
Fire-escapes and ladders—2586—C. Oates.
Fire-grates—2494—E. Y. Robbins.
Fringes—2560—J. Holliday.
Fuel economizer—2584—J. Perrin.
Hoops, &c., rolling—2588—W. Brown.
Hops, &c., extracting liquid from—2540—H. Woods.
Hydrogen—2548—C. E. Brooman.
Ice, artificial—2544—E. J. C. Welch.
Jewellery—2594—R. Lowe and J. Taylor.
Ladders—2498—G. Smith.
Lead refining—1515—O. Wassermann and J. H. Herbst.
Life-boats, &c., launching—2534—J. B. Rogers.
Liquids, heating, &c.—2500—H. G. Graham.
Looms—2552—J. Marsden.
Marble slabs, &c., polishing, &c.—2572—A. M. Clark.
Mattresses—2496—E. T. Archer.
Mineral oils, &c., for illuminating purposes—2606—G. Pickin.
Motive-power—2600—W. E. Newton.
Ores, &c., washing—2568—C. Mather.
Organs—1954—J. Verreyt.
Purses, &c.—2574—F. Weintraud.
Railway brakes—2598—H. A. Bonneville.
Railway carriages, excluding dust from—2526—W. G. Creamer.
Railway fish-plates—2558—J. Dicken.
Reaping machines—2582—H. Stewart.
Roofs, covering—2612—W. Le Duc.
Rotary engines—2536—E. Hubner.
Scarfs, &c., securing—2616—S. Jay.
Sewing machines—2530—T. Cook.
Sewing machines, &c.—2610—W. J. Cunningham.
Ships—2528—A. M. Clark.
Sowing, hoeing, and raking apparatus—1452—J. Griffiths.
Stuffing-boxes, &c.—2556—J. Jordan.
Sulphur—2618—T. Bell.
Textile fabrics, extracting the colouring matter of indigo from—2546—W. E. Gedge.
Valves—2520—A. V. Newton.
Varnishes—2522—F. Versmann.
Velocipedes—1682—W. Tribe.
Warps—2518—E. Bernheim, G. W. Wilson, and E. Longworth.
Water wheels—2536—A. Kinton.
Waterproof materials, &c., substitute for—2604—J. Jeyes.
Winders—2542—R. W. Ewer.

Patents Sealed.

941. R. Canham & F. W. Kreut.	1046. H. A. Bonneville.
958. H. A. Bonneville.	1215. W. E. Newton.
962. F. J. Manceaux.	1281. F. Walton.
969. J. Prentice.	2167. C. E. Brooman.
972. J. Lewis and G. Clark.	

From Commissioners of Patents' Journal, October 1st.

Patents Sealed.

983. J. Mahler.	1035. J. C. Roseaux.
984. J. A. Moll.	1054. C. F. Claus.
994. A. S. Hallidie.	1055. D. J. Fleetwood.
997. P. Spence.	1058. J. L. Davies.
999. J. W. Scott.	1088. W. Robertson and J. G. Orchar.
1009. J. Ladley.	
1010. W. C. Webber.	1095. T. H. Head.
1011. E. Pilling and J. Harper.	1104. C. G. Gillyatt.
1013. J. Petrie, jun.	1205. T. Booth.
1015. J. M. Kilner.	2226. W. R. Lake.
1016. B. Fowler and D. Greig.	2227. W. R. Lake.
1027. W. Adair.	2238. J. Dewar.
1034. W. P. Butebart.	

Patents on which the Stamp Duty of £50 has been Paid.

2366. H. C. Symons.	2410. W. H. Graveley.
2420. E. Loysel.	2501. G. H. Reay.
2391. A. Cuthell.	2378. G. Davies.
2401. G. Lindsley.	2396. G. Haseltine.
2402. G. H. Harrington and H. and F. Y. Hewetson.	2398. T. Bennett.
	2418. P. Winton.

Patents on which the Stamp Duty of £100 has been Paid.

2322. J. H. Johnson.	2363. A. Warner.
2503. G. Davies.	

Journal of the Society of Arts.

FRIDAY, OCTOBER 11, 1867.

PARIS EXHIBITION.

The weather, or the condition of trade and of the money market, or both combined, are having a sad effect on the interest of the guarantors of the Exhibition; the number of visitors which it was expected would by this time be greatly increased, has fallen below 30,000 a-day. The coming of the Emperor of Austria will, doubtless, have a good effect, but his Majesty will not arrive here till the 24th or 25th instant. Arrangements are being made for a grand closing ceremonial, at which the remaining prizes, those in agriculture and horticulture, will be announced, and possibly distributed, with others not yet delivered. The presence of the Emperor and Empress of Austria will give *éclat* to this closing *fête*.

M. Matthieu, member of the Institut, who was charged with the duty of drawing up a report on the weights and measures of various countries, is said to have completed his work, and delivered it to the committee specially appointed to take the subject into consideration; it is added also that the committee has drafted a plan for a general system of weights and measures.

The Minister of Commerce has recommended the Emperor to permit sale by auction, or otherwise, of goods or other objects in the Exhibition, and a decree to that effect has just been promulgated. The proprietors of the International Club in the Exhibition grounds are thereby authorised to establish a room for sales by auction, or otherwise, provided such sale shall not interfere with the regulations of the Exhibition. Before proceeding to carry out the measure thus permitted by the decree, proprietors of the club are bound to deposit 60,000 francs (£2,400) in the hands of the directors of the Caisse des Dépôts et Consignations.

MUSEUM OF THE ARCHIVES OF FRANCE.

This new museum, the opening of which was announced in the *Journal* a few weeks since, presents a highly interesting collection of documents and objects illustrative of the history of France. The museum occupies six rooms in the Hôtel des Archives, formerly the residence of the Prince de Soubise, in the Rue de Paradis, not far from the Place de la Bastille; the courtyard, the grand staircase, and other parts of the hôtel are remarkable in an architectural point of view. The museum is on the first floor, and the first *salle*, which is the largest of the six, contains a large number of rare charters, diplomas, and other documents of the Merovingian and Carlovingian periods, written on papyrus or parchment; charters of the fourteenth century; and registers, cartularies and illuminated manuscripts of the thirteenth, fourteenth, and fifteenth centuries. Amongst the documents on papyrus of the seventh and eighth centuries are several Acts relating to the Abbey of Saint Denis, by Clotaire II. (625), Dagobert I., Clovis II., Clotaire III., and Charles the Bald; and a letter addressed by Maginarius, Abbot of Saint Denis, to Charlemagne. In cases, in the centre of the room, is a fine collection of miniatures and illuminations on vellum, including some very remarkable specimens; one of these is a manuscript, entitled "Universal and Genealogical History," illustrated, commencing with the history of Adam and Eve in Paradise; it is written on twelve sheets of parchment, in the form of a roll, twelve yards long and more than twenty inches wide; there is no date, but the manuscript is in the style of the fourteenth century.

In the same apartment is a series of wax tablets, fourteen in number, on which the accounts of the Hôtel of Saint Louis were kept by Jean Sarragin, during the years 1256 and 1257; the writing was executed with a stylus. Most of these curious tablets are in excellent preservation. In the second room are charters and diplomas, being the signatures of monarchs and others of the sixteenth century; there is also a note in cypher by Jeanne d'Albert, Queen of Navarre, and mother of Henri IV. The third apartment was formerly the bedroom of the Prince de Soubise, is decorated with old carved wood work, tapestry, and some paintings by Boucher, and contains seals and manuscripts of the time of the revolution; several of these, executed by the unfortunate Louis XVI. while a prisoner in the Temple, bear the signature Louis Charles Capet. The next *salle* was formerly the boudoir of the Princess de Rohan, and in the centre is a glass case containing documents of the time of Napoleon, letters of various members of the Imperial family, and the will of Napoleon, exhibiting the codicil written by his own hand at Saint Helena. The other two apartments contain documents of still later date than the preceding. It is curious that Paris should not previously have possessed any public collection of this kind, with the exception of some few historical documents to be seen at the Louvre and in the Imperial library, while Rouen and several other public libraries in the provinces are famous for their illuminated manuscripts.

It is not generally known that the establishment of the Archives of France is connected with a college called the Ecole Imperiales des Chartes, established in 1821 for the study of documents, dialects, and writings of the middle ages; the college grants the degree of *Archiviste Paléographe*, which is held in high estimation, and the keepers of local archives are elected from amongst the successful students of the college.

MINERAL RESOURCES OF NEWFOUNDLAND

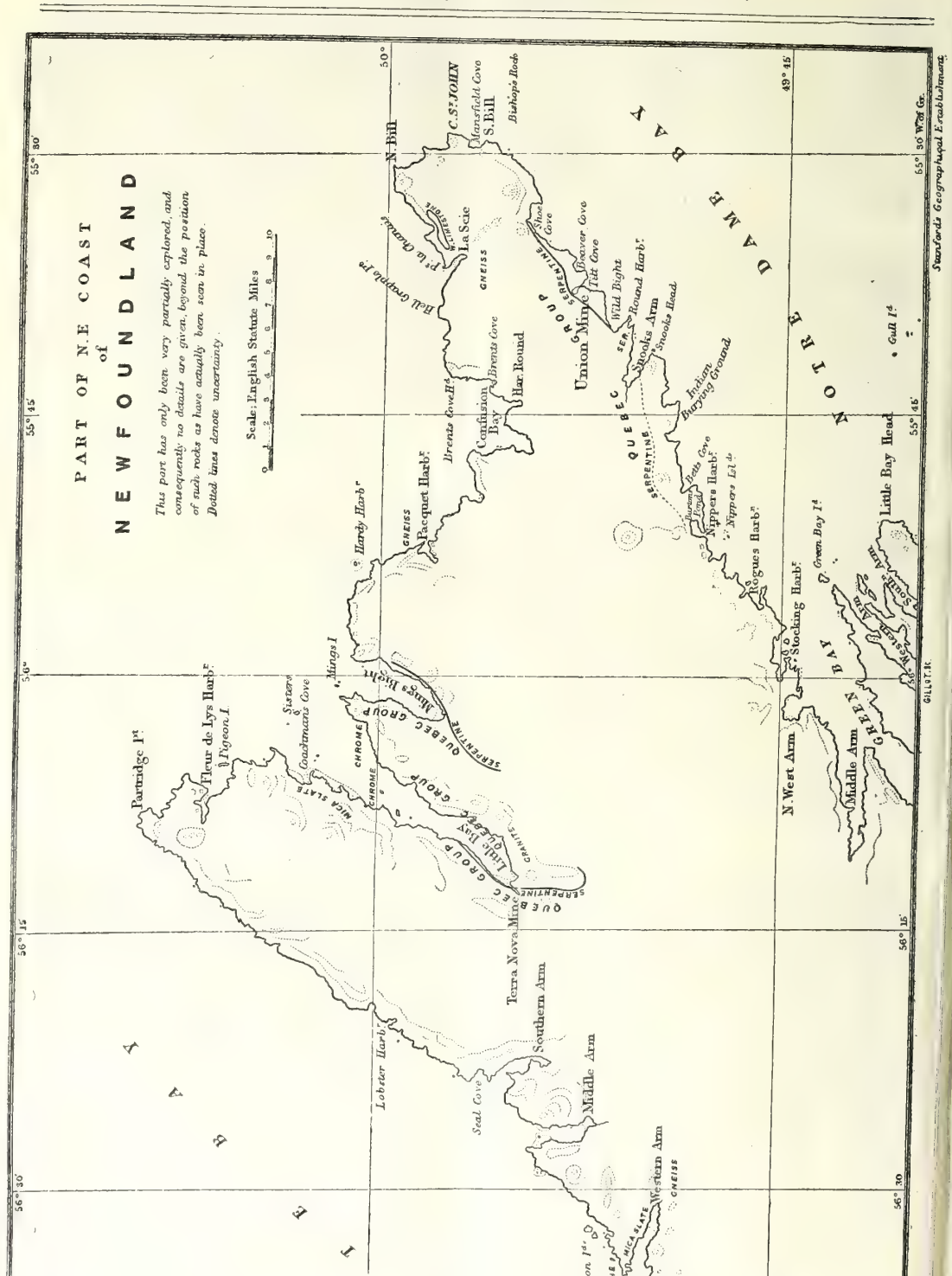
The following report on this subject has been addressed to the Crown Agent for the Colonies:—

Sir,—A copy of a correspondence between his Excellency A. Musgrave, Esq., Governor of Newfoundland, and the Crown Agent for the Colonies, in London, has been placed in my hands, relating to the mineral resources of that colony, it being the purpose of the authorities to bring certain portions of country where minerals are supposed to exist to public sale.

As I have been engaged for the last three years in making a geological survey of Newfoundland, and have during that time explored a considerable part of the island, the local government have been pleased to direct me to express my views on this matter, so far as my present information will permit, in answer to certain queries made in a letter to His Excellency the Governor, from Mr. W. C. Sargeaunt, Crown Agent for the Colonies, dated the 30th March, 1867.

It may be well to premise these remarks by stating that in a wild and unknown country there are many and serious difficulties to contend against while working out the structure and distribution of the geological formations, and ascertaining their several characteristics, mineral and fossil; and that while pursuing these duties it would be utterly impracticable for the geologist to devote such time, labour, and expense upon any one particular spot or even locality as would be required for the development of ores or minerals with a view to practical mining, yet in carrying out such an investigation there is no doubt a great amount of information may be acquired in a great degree important to mining adventure.

It is greatly to be regretted by all who have the interests of the province at heart, that grossly exaggerated statements, referring to the mineral wealth of New-


PART OF N.E COAST
of
NEWFOUNDLAND
This part has only been very partially explored, and consequently no details are given, beyond the position of such rocks as have actually been seen in place.
Dotted lines denote uncertainty.
Scale: English Statute Miles
0 1 2 3 4 5 6 7 8 9 10
BAY
DAMARE
TRINITY
BAY
GREEN
BAY
N. Bill
C. St. JOHN
Mansfield Cove
S. Bill
Bishop's Rock
Bull Gamble Pt.
Pt. la Chaudière
La Scie
GNEISS
Shoe Cove
Beaver Cove
Tilt Cove
Wild Bight
Union Mine
GROUP OF SERPENTINE
QUEBEC
SERPENTINE
Round Harb.r
Snooks Arm
Snooks Head
Indian Burying Ground
Brents Cove
Brents Cove Hd.
Confusion Bay
Har. Round
Hardy Harb.r
Pacquet Harb.r
GNEISS
Nippers Harb.r
Nippers Lit.le
Rogues Harb.r
Stocking Harb.r
Green Bay Pt.
Little Bay Head
Gull Is.ds
N. West Arm
Middle Arm
Sandy Point
GILLOT.N.
Mings I.
Blue's Berth
QUEBEC GROUP
SERPENTINE
CHROME
MICA SLATE
Partridge Pt.
Fleur de Lys Harb.r
Pigeon I.
Sisters
Coastmans Cove
Little Bay
Terra Nova Mine
GRAPHITE
Lobster Harb.r
Seal Cove
Southern Arm
Middle Arm
Western Arm
GNEISS
Pigeon Is.ds
WHITE LIMESTONE
MICA SLATE
Hauling Point
Wiseman's Cove
Turbock Cove
Granite Is.ds
50°
55° 30'
55° 45'
56°
56° 15'
56° 30'
49° 45'
55° 30' West Gr.
Stanford's Geographical Establishment.

foundland, have at various times been circulated in a manner which has tended to retard rather than advance the object desired, propounding assertions too palpably improbable to admit of any consideration on the part of experienced persons. Nevertheless, there can be no doubt that the mineral indications in many instances are highly encouraging, and may ultimately prove of great importance to the colony.

The mineral productions which have been discovered at various times on different parts of the island are the ores of silver, copper, lead, iron, and manganese, with black and variegated marbles, large masses of gypsum in the lower carboniferous formation, plumbago and petroleum. Peat and shell marl abound at many parts on the surface.

A large tract of country is spread over by rocks of carboniferous age, but it is still doubtful whether they contain seams of coal sufficiently thick to be of commercial value. There are but three places, that I am aware of, where mining has been seriously attempted, viz., the "Terra Nova" mine, in Little Bay or Bay Vert; the "Union" mine at Tilt Cove, in Notre Dame Bay; and the "La Manche" mine at the head of Placentia Bay.* Copper ore in association with iron pyrites is produced at the two former of these locations, galena or sulphuret of lead from the latter, and as the work done at these places may to a certain extent afford an index to future similar operations, I shall endeavour to give my views respecting the geological horizon to which they belong, and the mode of their occurrence.

The accompanying map will show to a limited extent the distribution of that part of the lower Silurian system in which the Terra Nova and Union mines are situated; and the plan of the former, surveyed by myself, will illustrate the actual condition of the place up to the commencement of the present year; while, in order to make the matter of distribution as intelligible as possible, the following tabular arrangement of the formation is quoted from an Appendix to my Report for the year 1864-65, by Sir W. E. Logan:—

English Synonyms.	Complete Series.	Western Basin.	Eastern Basin.	Newfoundland.
Caradoc	12. Hudson river	Hudson river ..	.. ..	..
	11. Utica	Utica	.. ..	..
	10. Trenton group ..	Trenton group	.. ..	..
Caradoc (?)	9. Chazy	Chazy	.. ..	..
Llandeilo	8. Sillery (Quebec group.) ..	.. ..	Sillery	Sillery.
	7. Lauzon (Quebec group.) ..	.. ..	Lauzon	Lauzon.
	6. Lévis (Quebec group.) ..	.. ..	Lévis	Lévis.
	5. Upper calciferous ..	.. ..	.. ..	Upper calciferous.
Tumadoc	4. Lower calciferous ..	Lower calciferous	.. ..	Lower calciferous.
	3. Upper Potsdam ..	Upper Potsdam	.. ..	Upper Potsdam.
Lingula flags	2. Lower Potsdam ..	Lower Potsdam(?)	.. ..	Lower Potsdam.
	1. St. John group ..	.. ..	St. John group	St. John group.

Sir W. E. Logan remarks, in the same appendix, with regard to a portion of this formation:—"The Quebec group, 6, 7, and 8, is divided into three parts, named from localities where they are largely displayed. The first, or Lévis division, embraces the limestones and black slates of Point Lévis, Orleans Island, and Phillipsburgh, with their numerous fauna of trilobites and graptolites, for the most part identical with those of the Skiddaw slates. The second, or Lauzon division, was at first united with the preceding, but has been separated from it on account of its great mineralogical importance and distinctness, it being the metalliferous zone of the lower Silurian in North America. Magnesian rocks, including dolomites, magnesites, serpentines, diorites, chloritic and steatitic beds, with micaceous and gneissic strata, characterise the Lauzon division, which is moreover rich in copper ores, chiefly as inter-stratified cupriferous slates, and is accompanied by silver, gold, nickel, and chromium ores; the only fossils certainly recognised in it are an *Obolella* and two species of *Lingula* at its summit."

It will be seen by reference to the table that the Quebec group is fully developed in Newfoundland, and there is no doubt it is characterised in many respects by similar qualities to those displayed in the same formation in Canada. It is in the Lauzon division of this group (No 7 of the table), that the ores of copper have been hitherto chiefly observed, and it is in the same part of the formation that the two openings before referred to are situated. Dr. Sterry-Hunt, of the Geological Survey of Canada, in a pamphlet published in the *American Journal of Science*, in May, 1861, expresses his views regarding the economic importance of the Quebec group in the following words:—"This Quebec group is of considerable economic interest, inasmuch as it is the great metalliferous formation of North America. To it belongs the gold which is found along the Appalachian chain from Canada to Georgia, together with lead, zinc, copper, silver, cobalt, nickel, chrome, and titanium. I have long since called attention to the constant association of the latter metals, particularly chrome and nickel, with the ophiolites and other magnesian rocks of this series, while they are wanting in similar rocks of Laurentian age. The immense deposits of copper ore in East Tennessee, and the similar ores in Lower Canada, both of which are in beds subordinate to the stratification, belong to this group. The lead, copper, zinc, cobalt, and nickel of Missouri, and the copper of Lake Superior, also occur in rocks of the same age, which appears to be pre-eminently the metalliferous period."

A perusal of the survey of the Union mine will explain the conditions under which the ore occurs, and the relation the cupriferous strata bear to the serpentines; while the plan of the works and the accompanying section will show the actual progress made nearly up to the present time. Operations were first commenced at this place in 1865, during which year about 500 tons of ore were extracted, varying in quality from 7 to 23 per cent. of copper. In 1866 about 2,500 tons of ore were brought to the surface, which was divided and classed according to quality, as No. 1 and No. 2 ores. An analysis by Bath, of

* Small openings have been made at a great number of places where metalliferous indications presented themselves, but the work done at those parts has been too limited to be properly designated as mining.

Swansea, of some good average specimens of this ore, is said to have yielded from 17⅝ to to 21¼ of copper. About 120 men of all classes have been recently employed at these works.

An extract from a narrative of my own proceedings during the year 1865, addressed to His Excellency Governor Musgrave, expresses my views as to the probable mode in which these ores will be found to occur in this formation generally, and at this place in particular:—"While in the neighbourhood of Tilt Cove I took the opportunity of crossing over the peninsula from Shoe Cove to La Icie, in order to get a stratigraphical section of it as well as my time would permit. Without entering into particulars as to the lithological character or stratigraphical arrangement, I may broadly state that the ore deposits of Tilt Cove occur under conditions strikingly similar to those known in Eastern Canada, and to characterise rocks of contemporaneous origin. By reference to the plan, it may be observed that the metallic material is arranged in isolated, irregularly-shaped masses, through a set of strata conforming with beds above and below, of a calcareo-magnesian quality, and that these beds are succeeded on the north by a great body of serpentine. As, from all I have hitherto seen, and from all the information I have been able to gather, the copper will in this country most frequently be found to occur in a similar manner, that is to say, in beds, rather than in regular veins or lodes, I think it right to call particular attention to the facts of this case, and to express a strong opinion, for the benefit of adventurers or explorers, that the immediate neighbourhood of the serpentine rocks, wherever they may be found to exist, will be the most probable position for their labours to be crowned with success. These serpentines, besides being associated with many valuable metallic substances, frequently afford a beautiful variety of marble, which in many cases might of itself prove of considerable importance, added to which may be enumerated the frequent occurrence of other reverberatory minerals, such as soapstone, potstone, asbestos, and talc. Chromic iron is frequently associated with the serpentine, and may probably be discovered in some parts in workable quantity."

The experiment of the Union Mine has, so far as it has yet gone, proved eminently successful, and as the indications on the east side of Winsor pond exactly correspond with those on the west side, where the work is proceeding, it is but reasonable to infer that a vast amount of ore may be extracted from the same deposits beneath the pond, and further on in the strike on either side.

At the Terra Nova location the experiment of mining has not hitherto proved remunerative, but its position in relation to the serpentine may be regarded as favourable and worthy of more extended trial. The metalliferous stratum upon which the principal shaft has been sunk, and upon which the drifts are driven, appears chiefly to consist of an enormous mass of iron pyrites, with an occasional admixture of yellow sulphuret of copper. Native copper has been observed occasionally in small quantities among the serpentine. Reference to the plan will show that the mining done up to the end of last year is confined to a small space, and that the ground is by no means thoroughly proved, although a very large amount of labour and expense has been bestowed upon the surface.

From what has been stated above, therefore, it will be evident that the distribution of the serpentine is a matter of high importance to those interested in the discovery of metalliferous ores, and, as the formation of which it forms a part is largely developed in various parts of the island, there is good reason to anticipate that Newfoundland will become, in course of time, a great field for mining industry. The serpentine is largely developed on the north side of Hare Bay, and between that bay and Pistolet Bay; it occurs also in great extent on the west side of the island, at York Harbour in the Bay of Islands, and from the southern arm of that bay to Bonne Bay.

From the evidence procured from Topsail Head, in Conception Bay, there appears to be a great series of strata of more ancient date than the lowest Silurian and newer than the Laurentian, consisting of slates, with interstratified bands of quartzite, diorite, and jaspery beds, the latter often of a red colour, with a mass of red or grey altered sandstone and conglomerate at the summit. These rocks are intersected by numerous veins, most frequently of quartz, but in many cases of calc-spar, or a mixture of the two, which occasionally contain the ores of lead, sometimes associated with silver and copper. The rocks of the La Manche locality will probably prove to belong to this series, but the formation has as yet only partially been followed out. As regards the mine, circumstances at the time of my visit to the latter place unfortunately prevented me from making a thorough examination of the ground, and such information as I was able to obtain is given in a preliminary report of mine, addressed to his excellency on the 1st March last:—

"The La Manche mine is situated near the north-eastern extremity of Placentia Bay, between Little Southern Harbour and Little Bay. The vein that is worked for lead varies in width from three to six feet, and is chiefly of calc spar, much of which is tinged of a pale pinkish amethystine colour. Sulphate of barytes, quartz, and fluor spar, are more or less distributed through the vein, the walls of which are frequently lined with beautiful crystals of amethystine quartz, and occasionally with blue or green malachite.

"The ore is distributed irregularly through the whole thickness of the vein, sometimes in pockets or lining drusy cavities or cracks, called vughs by the miners; but there appears to be also a pretty regular and continous string of ore near the middle of the lode, of from one to four inches in thickness, from which the prill ore, as it is termed, is chiefly derived. The run of the vein is about north 63° east (true bearing) from the water's edge, and its altitude vertical, maintaining that course and altitude with great regularity, and being traceable on the surface for a considerable distance. The lode cuts a set of green, very hard and brittle, compact cherty or jaspery slates, which cleave exactly with the bedding, and for the most part weather an opaque white, which discolouration extends into the stone for an inch or more. The dip on the south-eastern side of the lode is about north 27°, west 25°; that on the north side points in the same direction, but with an increased rate of inclination. From the position of the vein to the entrance of Little Southern Harbour, the measures gradually accumulate upon this dip, but as there are several dislocations observed in the cliff, it is probable the same stratum may be repeated. A considerable amount of red strata are visible in the cliffs, of a hard jaspery character, alternating with a rock of a dark bottle-green colour, having the aspect of diorite, but, being incapable of landing to examine that part of the coast, I am unable to state the mineral characters with certainty."

Indications of lead ore are of frequent occurrence at many parts where rocks supposed to be of the same horizon display themselves, as in the cliffs of Topsail Head, at Cape Chapeau Rouge, at Lawn, where some beautiful samples of silver ore were likewise discovered, and in the harbour of St. John's itself, facts tending to induce the belief that mineral treasures may reasonably be expected, in course of time, to be brought to light. Veins containg lead, however, are apparently not confined to any particular formation; the presence of that metal has been observed as low as the Laurentian, and as high as the coal measures; but whether the veins holding the ore are of one or different ages, has not been ascertained. One vein, which appears to be more recent than the lower carboniferous, and is mentioned in the narrative of my expedition in 1865, appears to be worthy of trial. The following is quoted from the narrative alluded to:—"It has been already stated that sandstones of the coal

formation come against a limestone of lower Silurian age, at a point between Romain's Brook and the Isthmus of Port-a-Port, in the Bay of St. George. This limestone strikes along the shore, in the direction of Cape St. George, and may probably reach that point, although, being unable to follow the coast, I cannot state that it does so with certainty. Inside the Bay of Port-a-Port, beds of calciferous limestone run along the shore, dipping at a moderate angle to the north, but at the head of the coves or indentations of the coast, these rocks are brought abruptly against another set of calcareous strata by a fault, the fossils of which are of the lower carboniferous age. Running in the line of dislocation, which at one part bears north 65° east, south 65° west, but which has generally, perhaps, a more nearly east and west course, galena, or the sulphuret of lead, reticulates in strings associated with large rhomboidal crystals of calc spar. The fault shows itself at intervals with its associated minerals, at the heads of several of the deeper coves at this part of the coast, and, as I was informed by a very intelligent resident, is again to be recognised to the westward, at a place called Piccadilly. The condition in which this galena occurs, is such as to warrant diligent investigation and trial on the part of mineral explorers, as there is great probability that in some parts of its course this lode may be found to produce a remunerative supply of ore."

Respecting the presence of the precious metals in the island, little is at present known. Some beautiful small specimens of a pure sulph-arseniuret of silver, usually called ruby silver, yielding, on analysis, 65·28 per cent. of the metal, and encrusted with chloride of silver, known as horn silver, were discovered some years ago, at a place called Lawn, on the south shore, not far from Cape Chapeau Rouge; and small specs of gold have been exhibited, which were said to have been derived from a vein of quartz, near Ming's Bight, on the north-east side of the island. During the past season, several samples of quartz veins were procured by myself, where no probability of the precious metals was suspected, and some were forwarded to Montreal for analysis, the result of which is given below, with each locality.

Supposed Laurentian.

Quartz, with iron pyrites visible, from Deer Lake, Humber River	Silver, 0·0205 per cent. Gold, none.	
Quartz veins on the island, Deer Lake, ditto	Silver, 0·0060 Gold, none.	,,
Quartz veins from the south shore of Deer Lake	Silver, 0·02633 Gold, none.	,,

Lower Silurian.

Quartz and calc spar veins from Brake's Landing, at the entrance to the Humber River	Silver, 0·01033 Gold, minute traces.	,,
Quartz veins from Meadow Point, Humber Arm, Bay of Islands	Silver, 0·00666 Gold, traces.	,,
Quartz veins from calcareous slate, from Cooke's Cove, Humber Arm, Bay of Islands	Silver, 0·00833 Gold, traces.	,,

(Signed) E. J. Blackwell,
For G. P. Girdwood, Assist.-Chemist, Montreal.

It will be seen that the presence of silver is indicated, to a small extent, in all these samples, while a trace of gold is detectable in each of the veins cutting lower Silurian strata; none whatever in those intersecting the Laurentian.

Gypsum is largely developed on the western side of the island, among the lower members of the carboniferous system; there is a vast exposure of that mineral on the coast between Codroy Island and the Codroy River, where it might be quarried to any extent, while there is a moderately good harbour for small vessels in Codroy Island. The same mineral occurs at various parts of the coast in St. George's Bay, on both the north and south sides, but those parts are usually rather unfavourable for vessels lying safely at anchor, although frequent opportunities may be had during the summer months for taking in cargo. At Romain's Brook, on the north side of the bay, there is a large exposure of gypsum, much of which is very pure white, and will probably be found to be well adapted for stucco purposes.

Besides the metallic ores and the more valuable substances, the island abounds in material of great economic importance. Marbles of almost every shade of colour have been produced from various parts of the coast, on both the eastern and western shores. Roofing slates of excellent quality are already known and partially worked in Trinity Bay. Plumbago occurs in the Bay of Despair. Indications of petroleum have been observed at a few localities, while building stone, whetstones, grindstones, and limestone are in ample profusion.

Notwithstanding the usually very forbidding aspect of the coast, there is clearly a large proportion of the country perfectly capable of being reclaimed, and converted into fairly productive grazing or arable land. The most favoured tracts that have yet come under my own observation are in the coal measure districts, where the surface is often flat or gently undulating over great areas. In my report of last year, 1866-67, I have shown, by a rough calculation, that there are probably about 726 square miles, or 446,080 square acres, more or less available for settlement on the carboniferous country of the western part of the island alone, which embraces the following districts:—

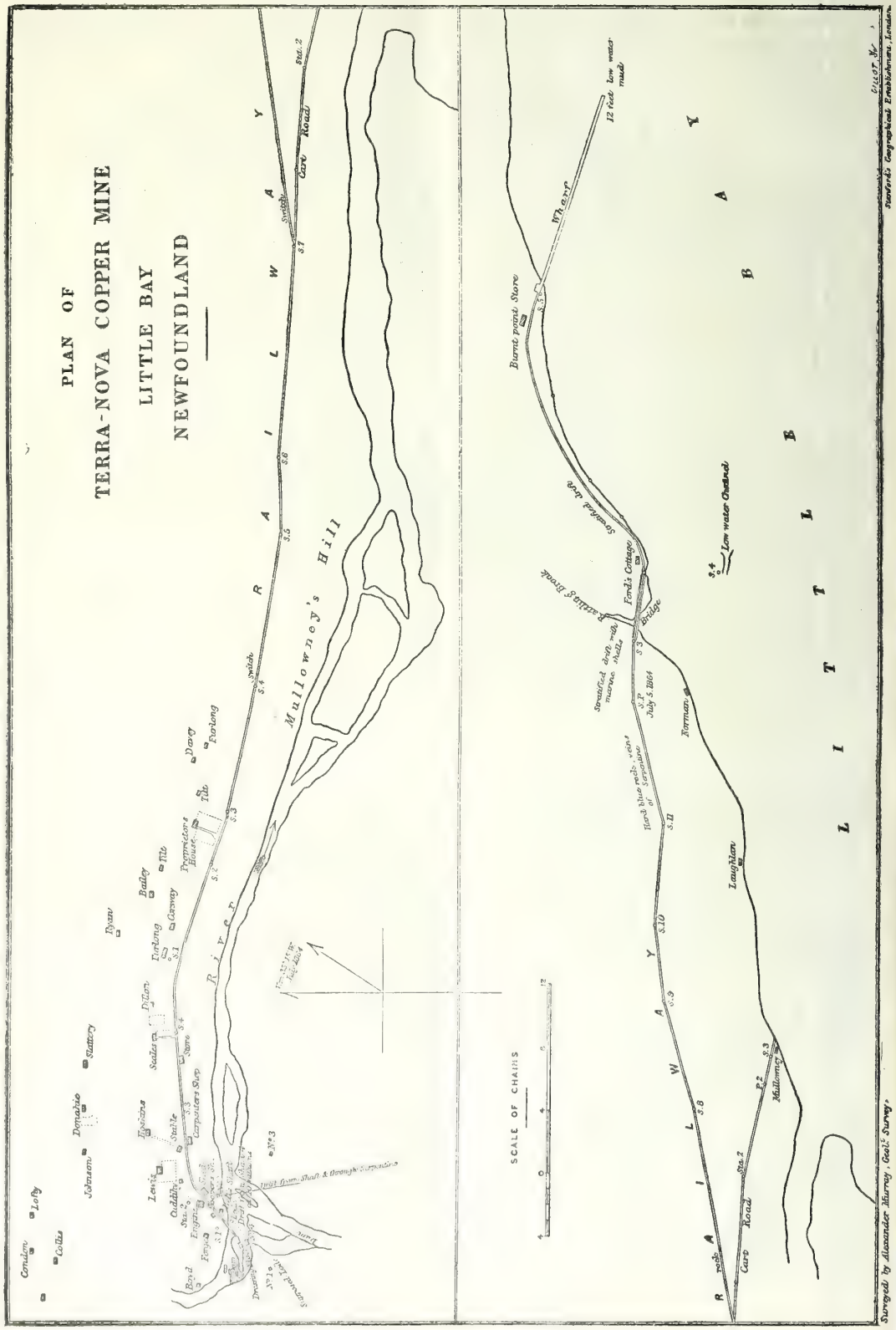
	Sq. miles.		Sq. acres.
Corduroy Valley	75	=	48,000
St. George's Bay	222	=	142,080
Humber River	429	=	256,000
Total	726	=	446,080

These valleys are for the most part well wooded, producing, in many instances, large pines, juniper, or tamarack (the latter a species of larch), fine yellow birch, and other valuable timber. In the valley of the Humber this is especially the case, where a large area of country appears to be provided with all the necessary material for ship-building in a remarkable degree.

With the exception of two inconsiderable rapids, there is no obstruction to the navigation of the river by large boats for 32 miles up its course, where timber of the various species is amply abundant (particularly at Deer Lake, and between it and the Grand Pond Forks), which might be procured without difficulty. Above the forks of the Grand Pond branch, the streams in each instance become very rapid, but canoes have frequently navigated them both up and down. A comparatively easy route may be travelled across the island by following the southern stream to the Grand Pond, and thence to its main sources, while a "portage" of a few miles from Birchy Pond (one of the head lakes of the Grand Pond branch of the Humber) will reach the waters of the Indian Brook, which flows into the sea at Hall's Bay, on the eastern side of the island, and is only interrupted in its course by one small fall, about three miles above the outlet. The northern branch of the river is also accessible for canoes, and at one part, where its upward course bends round to the westward, the distance to be travelled to the head of White Bay is within ten miles.

The construction of a few main lines of road, for which (with the exception of about three miles at the mouth of the Humber) the whole of the Humber region offers considerable facilities, together with the natural means of communication by water, might be made to open up a thriving settlement through the very heart of the island.

With regard to water-power as a means for working machinery, the physical character of the country is such


PLAN OF
TERRA-NOVA COPPER MINE
LITTLE BAY
NEWFOUNDLAND
Mullowney's Hill
RIVER
LITTLE BAY
Burnt point Store
Ford's Cottage
Bridge
Laughlan
Mullowney
Cove Road
Switch
Dwg
Tlr
Stable
Carpenters Shop
Provisions House
Smiths Shop
Engine House
Boiler House
Scales
Offices
Lewis
Cribbin
Boyd
Ryan
Johnson
Donahoe
Slattery
Conden
Loby
Collis
Bailey
Gosway
Forlong
Pitts
Low water Ordinal
12 feet low water mark
SCALE OF CHAINS
Surveyed by Alexander Murray, Geol. Survey.
Norie's Geographical Establishment, London.

UNION MINE, TILT COVE, NEWFOUNDLAND.

LONGITUDINAL SECTION OF LEVELS

ONE CHAIN TO ONE INCH

50 0 50 FEET

Mine Bluff

Upper Level

Adit level

Pond level

Sea Level

The yellow represents stringe and bunches of Ore cutting obliquely across the stratification

SECTION.

PLAN OF LEVELS

ONE CHAIN TO ONE INCH

50 0 50 FEET

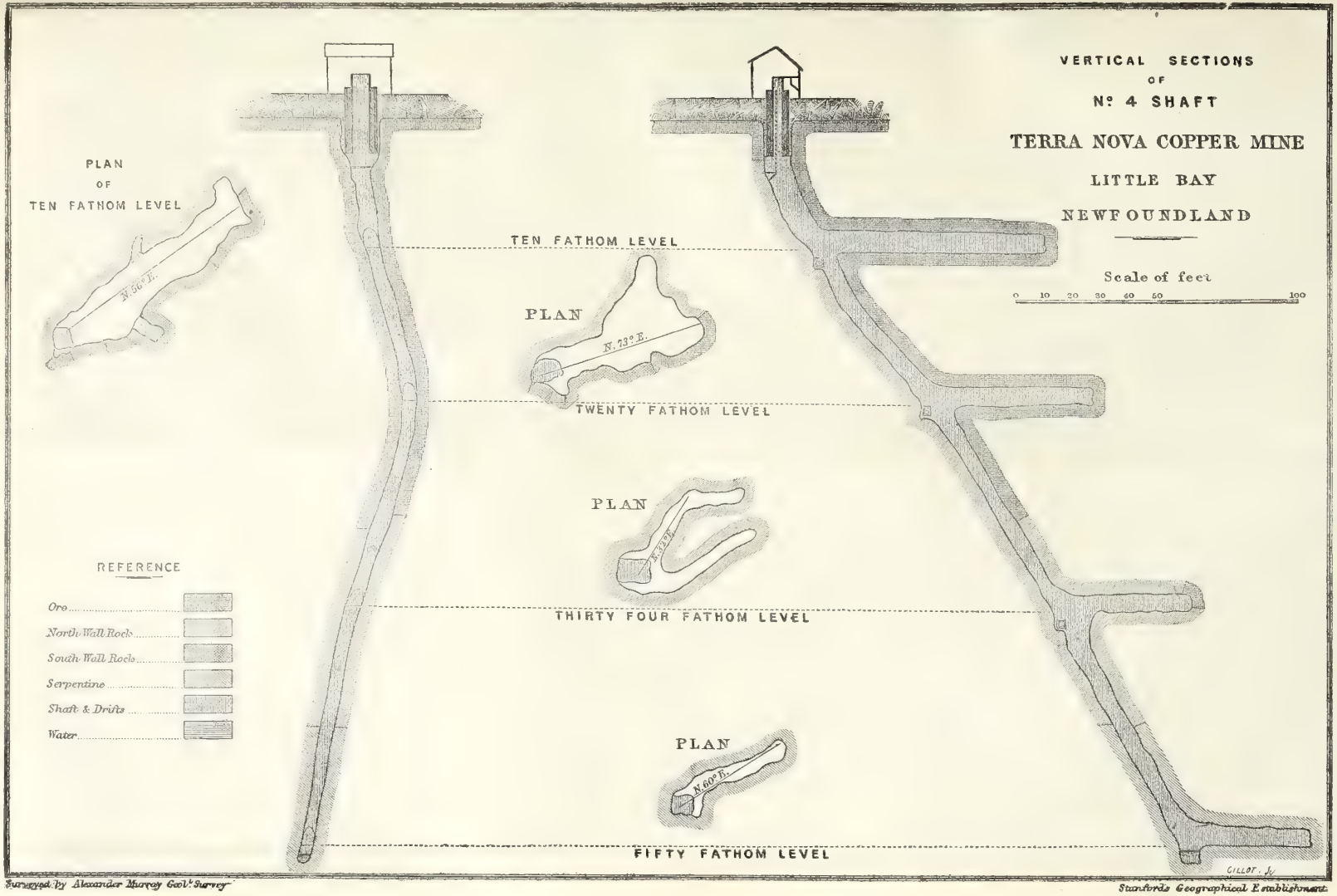
NOTE.

The yellow represents where ore occurs
The part shaded, dead ground.

Scale Four Chains to One Inch

Surveyed by Alexander Murray Geol. Survy

Stanford's Geographical Establishment


VERTICAL SECTIONS
OF
Nº 4 SHAFT
TERRA NOVA COPPER MINE
LITTLE BAY
NEWFOUNDLAND
Scale of feet
0 10 20 30 40 50 100
PLAN
OF
TEN FATHOM LEVEL
N.56° E.
TEN FATHOM LEVEL
PLAN
N.73° E.
TWENTY FATHOM LEVEL
PLAN
N.45° E.
THIRTY FOUR FATHOM LEVEL
PLAN
N.60° E.
FIFTY FATHOM LEVEL
REFERENCE
Ore
North Wall Rocks
South Wall Rocks
Serpentine
Shaft & Drifts
Water
Surveyed by Alexander Murray Geol. Survey
Stanfords Geographical Establishment

that it can be obtained at nearly every part in unlimited abundance. Ponds and lakes are dotted over the surface of the country to such an extent that it may be doubtful whether the superficial area covered by water is not equal to that of the land, and many of them, being at a great elevation, give rise to innumerable mountain torrents, which give their tribute to the main stream in the valleys at short intervals between each other.

The climate of Newfoundland is not by any means so severe as is generally supposed. The range of the thermometer is very much less than it is in any part of the Canadas, the heat in summer seldom exceeding from 70° to 75° Fahr., while the cold in winter is seldom very much below zero. The fogs, generally supposed by those unacquainted with the country to envelope the whole island almost eternally, have but a limited existence in the interior, and are not by any means prevalent on the northern or western shores, although they certainly prevail on the southern shores generally, and at Placentia and Trinity Bays particularly.

Provisions have hitherto been chiefly supplied from Halifax or Prince Edward's Island, but, should mining and agricultural pursuits combined be once fairly established, I see no reason to doubt the capability of the island to raise all the necessaries of life for its inhabitants.

I have the honour to be, Sir,
Your obedient servant,
Alex. Murray.

W. C. Sargeaunt, Esq., Crown Agent for the Colonies, Spring-gardens, Charing-cross, London.

The following extract, from a letter written by Mr. Murray, on the 10th September last, and dated Union Mine, Salt Cove, Newfoundland, gives more recent information:—

"The prospects of the mine are of the most highly encouraging nature, and as it may be of importance that the truth should be known in England, I should like my opinion of the matter published in the *Journal*, as a rider to my letter to Mr. Sargeaunt.

The production of copper ore from the commencement of the present year has been as follows:—

"The amount of ore accumulated during the winter of 1866–7, and shipped for Swansea, up to the 1st August, 1867	2,200	tons.
"The amount of ore on the floor ready for shipment	880	,,
"Ore ready in the mine	500	,,
	3,580	tons.

And if the necessary shipping is supplied, the total amount of ore exported for the season will not be less than 4,000 tons. In working out this, the masses of ore have in no one case been exhausted, but simply driven through and the material extracted from the drifts; the experiment of proving the ground being carried on all the time, and constantly exhibiting new and most important masses; and I have no hesitation in stating, from my own personal observation of all the circumstances, that the ore now in sight is sufficient in itself to keep up a supply, at least equal to that of the present season, for several years to come.

"I consider that the facts, which are indubitable, of the success of this mine ought to be of such interest to capitalists as to induce many to venture on similar experiments in different parts of this island, where the geological conditions are similar or identical; but I would recommend at the same time that great care should be taken to be assured of the said geological conditions, as many metalliferous indications occur at parts where, so far as I can judge, they are of little importance, although ignorant and interested parties abound who will unhesitatingly give most exaggerated statements without the slightest foundation in fact."

STREET AND ROAD FOUNDATIONS AND SURFACES.

By W. Bridges Adams.

People connected with railways talk at times about "permanent way," a very desirable quantity, but still as far from common practice as "squaring the circle," or other puzzling problems of the schools. But it is not surprising that the modern iron ways should be ephemeral when our ancient ways called roads and streets have never yet attained a permanent condition. In excuse for the streets it is alleged that the constant necessity of digging up the surface to get to gas and water pipes and sewers, prevents the possibility of permanent structure.

But supposing a position with a surface not to be disturbed by hydro-pipeds and hydrogeni-pipeds, are we prepared with any mechanical structure as a covering adapted for permanence? We have had wood, and stone, and iron, and broken stones, and asphalte, and asphalte and stone, and big stones, and small stones, but we have had nothing that, under heavy work, lasts more than a year or two. The reason for this is that they have no foundation worthy the name; the surface is relied on both for strength and wear. Sometimes concrete is applied as a foundation, but too thin to resist, and therefore breaking, as each stone is rammed down in succession, like a row of nails, by passing wheels.

Now suppose our great London Ædile, Sir John Thwaites, should, for once, take it into his official head that there ought to be, and should be, laid down a sample London road, and say, *sic volo sic jubeo*, there is an admirable site at hand, and under his control, in the Thames Embankment, as yet guiltless of underground tubes save the brick tunnel.

Sir John Thwaites will therefore reason thus:—"A good road must consist of two parts; a solid, firm, but still an elastic foundation,—a substructure with a superstructure on it for the purposes of wear. It is well known that a surface of broad flag-stones is much less liable to disturbance than one composed of small stones, and the great size of the stones was the reason why the ancient Italian roads have descended to us undisturbed by time, though worn into gullies by the wheel tracks. Upon new embankments concrete is apt to settle and break. We want, therefore, a substance that will not settle and break. This is to be found in timber. But timber is apt to rot. But timber creosoted is not apt to rot, and is very durable. A creosoted timber floor, then, is the thing to aim at, but not an ordinary floor of boards laid down on joists."

Sir John will say, with sound, common Saxon sense, "Let us lay down the rules after the fashion of Mrs. Glasse:"—

"Take a sufficient number of the common deals of commerce, nine inches wide and three inches thick, and saturate them thoroughly with creosote, then level the surface of the projected road and lay down on it the deals side by side, then cross these deals with others at a right angle, till a double floor is formed, which will not require any fastenings but the curb stones to keep them in position; the road proper is thus complete, and only needs surfacing. A very good surface could be made by laying down kentledge, or ships' cast-iron ballast, measuring about two feet in length by four inches square; if objected to as too heavy it might be cast in the form of hollow boxes, or hollow cubes in ridges might be applied, or stone cubes made to fit accurately to each other and on to the planking, every side being square and smooth, but with the edges arrised for horses' foothold. In this mode the road might be made nearly flat. If rough cubes were used, they would need to be grouted with hot lime grout.

"Such a road would at all times preserve an even surface, and blows from horses feet and wheels would be distributed over a large space through an elastic medium, which, while modifying noise, would greatly diminish resistance to traction, and prevent breakage of the surface as well as wear. It would be like travelling

over a large sheet of ice. The road might be more costly at the outset than other roads, but it would be infinitely more durable, and upon the whole it would probably be cheaper than the sham structures now passing under the name of roads. It would, moreover, be most rapidly laid down and renewed, and be perfectly free from dust and nuisance, and very easily cleansed on the surface; and would be highly appreciated by the public using it. On the whole, therefore, it is decidedly a proper thing for the Board of Works to set so good an example."

We think the public will agree with Sir John, and that Baron Hausmann will pale his pretensions before the doings of our great London Ædile, who will thus

"Achieve a name,
Beyond all Greek, beyond all Roman fame."

And when Sir John has set this good example, perhaps Mr. Cowper will take heart-o'-grace, and, for the first time, give us really dry surfaces in front of Buckingham Palace and the Horse Guards, with Macadam, if he prefers it, on a creosoted timber floor.

Manufactures.

Boiler Explosions.—Mr. L. E. Fletcher, chief-engineer of the Association for the Prevention of Steam-boiler Explosions, in a recent report states that, during the past month 272 visits of inspection have been made, and 624 boilers examined, 392 externally, six internally, eleven in the flues, and 215 entirely, while in addition four have been tested by hydraulic pressure. In these boilers 170 defects have been discovered, six of those being dangerous. He then gives a tabular statement of defects, omissions, &c., met with in the boilers examined, from which it appears that a high number of 'entire' examinations is still maintained, as many as 215 boilers, out of the 624 inspected during the past month, having been examined 'entirely,' that is to say, internally as well as in the flues. It is on these 'entire' examinations that the Association relies more especially for the prevention of explosions, and therefore attaches considerable importance to their increasingly high number. This is greatly due to the working of the guarantee system, which makes an annual 'entire' examination of every boiler an essential condition of granting the guarantee. The defects met with, however, during the month were of an ordinary character, and do not present any features of sufficient interest to merit detail reference. As regards explosions, he says:—"Explosions are not occuring with the same rapidity this year as in many previous ones; and on the present occasion, as in the preceding month, I have but one explosion to report, which occurred to a boiler not under the inspection of this Association. No. 16 explosion is an illustration of the danger of setting boilers on mid-feathers, especially when the boilers are of large diameter. This explosion, which resulted in the death of two persons, as well as in injury to two others, occurred at a woollen mill, at twenty minutes after eight o'clock on the morning of Thursday, July 11th, when the engine was at rest during the breakfast time. The boiler was one of a series of three set alongside of the mill, and parallel with it, all of them being internally fired and worked at a pressure of about 30lb. on the square inch. The exploded boiler, which was the inner one of the series, and set nearest to the mill, was of the Cornish class, having a diameter of nine feet, a length of twenty-six feet, and being made of plates 17-16th of an inch in thickness; while the internal tube, which ran through the boiler from one end to the other, measured five feet in diameter at the furnace end, and tapered down to four feet behind the fire-bridge. The boiler gave way in the external shell, the primary rent occurring at the bottom, where in contact with the mid-feather wall, on which it rested. This primary rent extended longitudinally for a length of about ten feet, when at each end of this line it assumed a circumferential direction running more than half way round the boiler, and in this way severing from the shell a tongue or partial belt, consisting of five widths of plate, and situated nearly midway between the two ends of the boiler. This tongue was opened out nearly flat, and the boiler thrown forward some fifty feet from its original position, passing on its way through a four-storied house, which it brought to the ground; while, in addition, a considerable portion of the mill, close to which the boilers had been set, was blown down, the adjoining boiler in the series thrown from its seat, the boiler-house laid in ruins, and the mill brought to a standstill. The cause of this explosion I found, on visiting the scene of the catastrophe and examining the fragments of the exploded boiler, to be apparent at a glance. The edges of the plates, at the primary line of fracture which had run along the mid-feather wall, were seriously reduced in thickness by external corrosion, being eaten away to the thickness of 1-16th of an inch, while in some places they were as thin as a sheet of paper, so that the wonder is, not that the boiler exploded when it did, but that it had not done so long before. A careful flue examination by a competent inspector would have shown the dangerous state of this boiler in time to have prevented the explosion. Evidence to this effect was given at the inquest; a scientific witness stating that 'the explosion was not attributable to deficiency of water, but solely to extensive corrosion of the plates on the under side, caused by leakage of the seams, and dampness of the brickwork, which was a well-known source of danger, and ought to have been guarded against.' The jury brought in a verdict of 'Accidental death,' adding, however, that the owner of the boiler, as well as the person who had charge of it, were censurable for the explosion, though not criminally responsible, while the foreman took the opportunity of recommending that every millowner should have his boilers periodically examined. On this occurrence of another fatal explosion to a boiler resting upon a mid-feather wall, the members of the Association may be once more appealed to to discontinue so dangerous a mode of setting, and to adopt side walls with suitable seating blocks instead. This latter plan is superior on many grounds. If the flues are damp the moisture rises more readily through the mid-feather than through the side walls, as there is, in most cases, less height of brickwork in the former for it to travel through. Also, any water that may either fall on to the boiler or leak from the seams, is more liable to lodge in contact with the plates on the top of the mid-feather than on the side walls, the bearing surface of the mid-feather being at the bottom of the boiler so that it collects all the drainage, and being horizontal so that it retains it, while that of the side walls is inclined, and thus affords the water an opportunity of escaping. It is not thought, however, that the corrosive tendency of moisture is the only cause of the injurious effect of mid-feathers, but that it is materially promoted by mechanical action. A boiler does not 'ride' so comfortably on a single longitudinal seating as when carried on two, and when the weight of a large boiler is thrown entirely on a mid-feather, a change of form frequently takes place with every change of pressure. This has been distinctly observed on the application of the hydraulic test, the internal pressure raising the boiler, while it might no doubt be seen in some cases on getting up steam. In making internal examinations of boilers set on mid-feathers, the plates at the bottom of the shell are not unfrequently seen to be flattened all the way along at the centre line, so that the mid-feather can be distinctly traced even inside the boiler. It will thus be seen that an alternate flattening movement is carried on throughout the line of the mid-feather wall on every variation of internal pressure, which tends not only to strain the ring seams of rivets and make them leak, but by its buckling action to 'fatigue' the metal, and thus

very much to accelerate the ravages of corrosion from moisture upon the body of the plates, so that a mid-feather wall may be said to produce a description of longitudinal 'furrowing' along its bearing surface. This will show the importance of the recommendation constantly made to those members who have boilers set on mid-feather walls, that they should have the brickwork ploughed out at the transverse seams of rivets for purposes of inspection. Without this it is impossible to ascertain the condition of the plates, since, although they may appear perfectly sound on each side of the mid-feather wall, especially if it be a wide one, they may yet be dangerously wasted in a longitudinal 'furrow' all along the centre line. These openings need not be large; it will be sufficient if they are about nine inches long by three inches high, and cut completely across the wall, so that if a light be held on one side they can be seen through. They need not be permanently filled up after an inspection, but merely stopped temporarily with a little fire clay, so as to be easily re-opened whenever re-examination is necessary. In conclusion, it is earnestly recommended that no boilers, having a diameter of five feet and upwards, should be set on mid-feather walls, but if in the case of small boilers, and under exceptional circumstances any of these walls should still be adopted, then the boilers should rest on suitable seating blocks, instead of on bricks; while the bearing surface should not exceed an inch in width for every foot in the diameter of the boiler, and sight-holes, as explained above, should be ploughed out at each of the ring seams of rivets." He then gives the following account of a fatal explosion of a hot-water bottle:—"This explosion took place on the 31st March, and though it cannot rank either among those of steam-boilers or household ones, yet, as it resulted in the death of one person, as well as in serious injury to two others, it is of importance socially; while, independently of its effects, it is of interest in a scientific point of view, and, therefore, the particulars of this explosion may be given, though it occurred only to a hot-water bottle. The bottle in question was of earthenware, of about a quart capacity, and used when full of hot water as a bed-warmer. It had been put to this service on a previous occasion, when the cork had been tied in with a wax end, such as is commonly used in shoemaking. When the bottle was wanted again for a similar purpose, instead of being emptied of its cold water and refilled with hot, it was put, all tightly corked, into the oven of a kitchen range, to be heated up entire. In a short time a violent explosion ensued, the bottle was burst in pieces, a corner of the oven door split off, and the fragments of iron and earthenware thrown into the room with so much force that three persons were seriously injured, one of them, a child, dying the day after. This explosion, though calculated from its simplicity to provoke a smile, is, in an engineering point of view, of considerable interest, and involves important principles. The explosion of household boilers is always attributed to the water supply being allowed to run short, and then suddenly re-admitted on to red-hot plates, which is supposed to be productive of a wonderfully disruptive force; while, with regard to explosions generally, it is too frequently thought that a gradual accumulation of steam is insufficient to produce the disastrous results attendant on them, which are therefore attributed to some sudden generation of pressure from the detonation of gases or other imaginary cause; while others again hold the opinion that no boiler can explode if suitably supplied with water, and that though it might rend, it would do so without violence. There is no getting away, however, from the facts of this explosion; its simplicity renders it most convincing. There was no pipe to suddenly re-admit the feed, as in the case of the household boiler, on to the supposed hot plates, while the circumstances forbid the explosion being attributed to any other cause than quiet internal pressure from the gradual accumulation of steam, which, it will be seen, did not quietly rend the bottle, but violently exploded it. This little incident supports the views expressed in the Association's report for January, 1867, relative to the explosions of household boilers, viz., that they were due simply to the gradual accumulation of steam, and might be prevented by an efficient safety-valve."

Commerce.

Supply of Cotton.—Messrs. George Fraser, Son, and Co., of Manchester, in their *Circular* for October 1st, say:—"With regard to cotton, although the stock will now begin rapidly to diminish for some months to come, all fears and anxiety as to the future supply may be considered to have passed, for—with a stock of 820,000 bales in Liverpool at the end of last week, and 330,000 bales on the water, and with the most reassuring accounts from all the principal cotton-growing districts of the world, with such local exceptions only as the plant is always liable to, however good the season—there does not seem to be any likelihood of scarcity; and as there is yet ample margin for a further fall before old normal values are touched, we shall probably see a gradual decline in prices until they become so low again as to be unremunerative to the planter, and thus lead to a curtailment in the extent of land put under cultivation."

Means of Transport in Italy.—The necessity for increasing and facilitating the means of communication has often been urged by us (*Giornale delle Arte e delle Industrie* of Florence) as the only way to develop the industries and commerce of this country. It appears, unfortunately, that these resources have been left to take care of themselves, and those whose interest it would seem to be to promote such undertakings seem to be opposed to any scheme of improvement. It will only be necessary to mention the following well-known trades and industries in order to form an idea of the great importance of a cheaper and more rapid means of communication to the future prosperity of the country. In the first place there is mineral fuel in Cadibona, Nocelto Orta, and the centre of Tuscany; it is well known that lignite, at present produced on a small scale, with an easy means of transport from the pits' mouth to the principal lines of railway, would increase to an enormous extent. In Sardinia these railways are not even made between the principal towns; the traction engine has an important mission to fulfil. Road locomotives will play even a more important part in Sicily, where many sulphur mines have been suspended on account of the serious expense attendant on the transport from the mines to the nearest seaport; and the same may be said for the various other products of this island, more especially wines, from which it might derive immense benefits. The same will be required for the Neapolitan provinces, and it is no secret that even in the Tuscan provinces the transport of goods is a most difficult problem. Road locomotives are required at Volterra for the transport of alabaster; at Serravezza and Stazzema for marbles; at Massa for the carriage of marbles, silver, and copper; at Spezia for the development of the immense mineral wealth that exists in the chain of mountains that surround it, stretching from the Apennines on the one hand to the plains of Parma on the other. Savona also for the glass works and various manufactures in the neighbourhood. The town of Chieri, rich in agricultural produce, requires to be put in communication with the Piedmontese railways. The northern part of the province of Novara, and, finally, a number of small towns and villages in Lombardy and the Venetian provinces, are in the same position. In conclusion, everything tends to show that a system of steam communication on the common roads cannot fail to be attended with most beneficial results.

New Telegraph to India.—A telegraphic conference has been held at Berne, which is said to have resulted in the signature of a draft treaty between France, Switzerland, Austria, and Turkey, with a view to the establishment of a line communicating with India without touching the soil of Prussia or Russia. Switzerland undertakes to lay down a special line for dispatches passing between Paris and Constantinople, which are to be entirely free from all control by the Swiss authorities, who will, however, receive a fee of one franc for each ordinary dispatch.

Colonies.

Trade of Victoria.—The imports for the first five months of the year have fallen short of those for the same period of last year by £691,968, and last year was a bad one. In the same period the exports have increased by £231,855. If the latter sum had represented articles of manufacture it might have been matter for congratulation, but unfortunately it represents only gold, of which the export of the produce of this colony exceeded that of 1866 by £337,012. The balance of imports over exports in the first five months of 1866 was in favour of the colony to the extent of £804,041, but during the same period of the present year it was only £129,722. The *Melbourne Argus* says:—"The colony unquestionably owes therefore to the operation of the tariff a loss of nearly £700,000 in the trade of the first five months of the year, without placing any value on the natural increase of business which ought to have accrued from the ordinary progress of a young country full of resources. But even these figures do not show the full extent of the loss which the country is sustaining through the operation of the tariff. In the first five months of 1866 we received from New Zealand 133,884 ozs. of gold, worth say £535,536, whilst in the same period of this year we imported only 81,836 ozs., worth about £327,344. That gold may be taken as representing the comparative value of our trade with New Zealand in these two periods. The gold-fields of the west coast of New Zealand are certainly not less productive than they were a year ago. The contrary, indeed, is the case. They are more numerous, more populous, more productive, and yet our trade with them has not only not increased, but has absolutely fallen off by over £200,000. None of the other countries have contributed materially, if at all, to make up this deficiency."

Exploration of North Australia.—The Government of South Australia has resolved upon making another expedition to the northern territory, under the command of Captain Cadell. Burke Town is to be the rendezvous, and in about three months the captain is to be at that seaport, when he will inform the South Australian Government of his ulterior intentions. Should all be in order on his arrival there, he will set sail, and proceed with the exploration of the whole of the Adam Bay country, besides Port Darwin, Anson Bay, Port Keats, and the Victoria River. It is probable that this expedition will be of great value, as Captain Cadell is provided with an ample number of horses, provisions, and men, and his vessels are also good ones.

Publications Issued.

The Civil Service Geography. (*Lockwood and Co.*) This is a manual of geography, general and political, arranged especially for examination candidates and the higher forms of schools. It is the work of the late Lancelot M. Dalrymple Spence (of H. M. Civil Service), and has been revised throughout by Thomas Gray, one of the Assistant-Secretaries to the Board of Trade. In the introduction, the author says that he has endeavoured to supply a want once experienced by himself, and, he believes, still felt by many about to undergo a Civil Service or other examination, where geography is one of the proposed subjects. The two great objects to be kept in view by the student are, to get mapped out in his mind the relative situations of places, and to acquire a knowledge of the general, political, and physical characteristics of each country. On this plan the present work is framed. To assist the student in attaining the first object, tabular lists, geographically arranged, of the principal divisions, towns, seas, gulfs, rivers, mountain ranges, &c., are prefixed to the accounts of the various countries, &c., comprised in the great divisions of the globe; and to aid him in acquiring a knowledge of the general, political, and physical characteristics of each country, a detailed description of all the most important countries in the world is given, their colonies and dependencies, with their mountains, rivers, lakes, and islands; their mode of government; their manufactures, exports and imports, population, army and navy, and many other particulars, are also described. The student is particularly recommended in this work to draw rough outline maps; for the purpose of learning geography (says the author) elaborate map-drawing is not required, and to attempt it is a great mistake, since, besides wasting much time, it is apt to divert the attention of the pupil from that which is the main object of map-drawing—viz., to fix in the mind a clear idea of the relative situations of places—and to concentrate it upon the neat execution of the drawing on which he is engaged. Some specimens of outline maps are introduced. In the compilation of this work the author has consulted the best and latest authorities, and it will doubtless be found generally useful, whether as a text-book for schools, or as affording a speedy method of acquiring knowledge for examinations. It will be found of value as a book of reference, for it includes a general index, which contains upwards of three thousand names.

Notes.

Telegraphic Dispatch Stamps in France.—There has been a report some time afloat in Paris that it was the intention of the Government to introduce special stamps for dispatches; this will shortly become a reality; the stamps are already prepared, and specimens of them are to be seen in the Exhibition at the Champ de Mars. When a dispatch has its proper stamp attached to it it may either be thrown into a box to be provided for the purpose, at a telegraph station, or it may be sent through the post-office in an envelope stamped as a letter, and marked "Telegraphic Dispatch." Some other improvements in the telegraphic service are to be introduced at the same time, but they are not yet made known. The boldness with which reforms have been introduced into the telegraphic system of France is well justified by the results achieved; the number of private dispatches in a year having increased from 48,103 in 1852 to 2,842,554 in 1866, and it is confidently anticipated that the facilities afforded by the use of stamps, and a proposed reduction in price, will create an immense further increase.

Supply of Water to Paris.—The arrangement for completing the last link of the proposed chain has just been made by the adjudication of the contracts for the works necessary for conveying the waters of the Vanne to Paris. The estimate for these works, including pipes and other iron work, was nineteen million and a half francs (£780,000), but there were a great many tenders, and a considerable reduction is said to have been made on several items. The water of the Vanne will have to be carried across nearly the whole of the department of the Yonne, a portion of those of the Seine-et-Marne, and of the Seine, to reach the new reservoir of Montrouge, which has already been mentioned in the *Journal*.

The Universities of Italy.—The University of Salerno, the first that was founded in Europe, dates from the early part of the 12th century. The university of Bologna was founded in 1158; that of Naples in 1224; the celebrated university of Padua in 1228; that of Rome in 1245; of Pisa in 1333; Palermo in 1394; Turin in 1405; Florence in 1438; Catania in 1445; Parma in 1482; this university was reorganised in 1606. The university of Macerata was founded in 1540; that of Messina in 1548; of Mantua in 1625; in the island of Sardinia the university of Cagliari in 1720; the university of Sassari in 1765; and that of Genoa in 1812.

Patents.

From Commissioners of Patents' Journal, October 4th.

Grants of Provisional Protection.

Attire, male and female—2529—J. G. Tongue.
Baling presses—2565—J. Whittome.
Blast engines—2682—L. R. Bodmer.
Boats, baths, &c.—1627—W. Bradford.
Boilers—2557—C. J. Spencer and F. Ware.
Boilers—2722—J. H. Johnson.
Boilers, regulating supply of water, &c., to—2674—C. Ritchie.
Bread ovens—2650—S. Dreyfous.
Candle fixers—2626—J. Soames.
Candles, ornamenting—2489—A. Field and W. B. Nation.
Carding engines—2642—J. J. and E. Harrison.
Cartridge holders—2547—W. R. Lake.
Cartridges—2409—J. and F. J. Jones.
Cereals, cleaning, &c.—2640—W. W. Gibson.
Charcoal—2680—J. Blair.
Coal, separating impurities from—2678—J. Hargreaves.
Cooking apparatus—2417—H. A. Bonneville.
Cucumber box—2567—J. Pottle.
Decorative material—2632—J. Rust.
Driving bands, &c., removing and cutting the hides of animals for the manufacture of—2471—A. M. Clark.
Embroidery, appliqué—2510—A. C. Henderson.
Fabrics, finishing, &c.—1733—F. B. Baker and L. Lindley.
Fabrics, weaving ornamental—2710—A. Taylor.
Fibrous substances, dressing—2533—J. Smith.
Fire, preservation of life from—2385—W. Dixon.
Fire-arms—2672—J. R. Cooper.
Fire-arms, breech-loading—2477—W. J. Matthews.
Fire-arms, breech-loading—2513—H. Carter and G. H. Edwards.
Fire-escapes—2509—R. A. Jones and J. C. Hedges.
Fires, lighting—2614—J. C. Bayley and D. Campbell.
Fires, &c., lighting—2491—J. McKechnie.
Fish-hooks—2714—A. Morrall.
Flannels—2658—D. Howard.
Flowers and foliage, colouring artificial—2644—A. M. Clark.
Furnaces, &c.—2541—J. Whitham.
Furnaces—2553—J. Eichhorn.
Furnaces—2562—J. Eichhorn.
Furnaces—2638—H. Fisher.
Furnaces—2670—S. C. Lister.
Gas—2694—C. D. Abel.
Gas lamps, &c., lighting—2531—J. J. Hicks.
Gas, &c.—2668—A. Aitchison and H. J. Grantham.
Grain, cleaning—2702—R. Waygood.
Grass, &c., cutting—2507—J. Howard and E. T. Bousfield.
Horse collars, &c., padding for—2517—G. H. Pierce.
Iron and steel—2704—J. Bower.
Iron and steel, &c.—2596—S. Dalton.
Jute, treating—2664—J. Baird.
Kaleidoscope—2634—J. Huggins.
Lamps—2708—G. H. J. Simmons.
Lamps, &c.—2648—J. G. Tongue.
Looms—2527—T. W. Helliwell.
Looms—2624—C. Litster and G. Storey.
Lubricators—2525—T. Hodson, W. Mather, and J. Ridley.
Manganese, &c., oxides of—2501—W. Weldon.
Matches, &c.—2662—B. B. and A. B. Blackburn.
Metals, &c., cutting, &c.—2497—A. M. Clark.
Milk cans—2495—L. N. Le Gras.
Minerals, boring, cutting, &c.—2503—F. B. Dœring.
Motive-power—2523—N. Seward.
Optical apparatus—2563—C. Sutton.
Paper and paper articles—2690—J. H. Brown.
Paper bags, &c., fastenings for—2429—W. E. Newton.
Paper machines—2487—C. Tessier.
Printing machinery—2537—D. Payne.
Pumps—2716—G. Wilkinson.
Pumps, rotary—2686—H. Forbes.
Railway brakes—2483—R. Watson.
Railway buffers—2519—J. B. Handyside.
Railway carriages—2381—C. Reifert.
Railway carriages, &c., propelling—2543—C. Burn.
Railway wheels—2511—W. H. Kitson.
Railways, ventilating underground—2684—S. Bevan.
Roof and roof pavement, illuminating—2539—B. F. Stevens.
Safes, &c.—2696—D. R. Ratcliff.
Safety lamps—2521—H. Gardner.
Screw-cutting and turning apparatus—2720—A. V. Newton.
Sewing machines—2636—T. Bletcher.
Ships' cables, stoppers for—2545—A. Paul.
Ships' propellers—2473—I. Dixon.
Ships' rudders, fitting—2555—J. Medhurst.
Snow, removing—2499—G. Crane.
Steam engines—2535—J. Armstrong and E. Eccleston.
Steam hammers—2676—J. Fletcher.
Stone-cutting tools—2485—A. V. Newton.
Telegraph conductors, testing—2622—F. H. Varley.
Thermometer—2561—C. E. Brooman.
Vegetable drying oils, treating the residuum which results from the clarification of—2656—G. E. Marchisio.
Vegetable substances, obtaining extracts from—2493—P. F. Lunde.
Water-closets—2688—G. Batcheldor.
Water meters—2700—G. Clayton and W. Marbeck.
Water, raising—2718—J. Brunton.
Wheat, &c., hulling—2508—G. A. Buchholz.
Wheels, &c., securing—2515—J. Ford.
Window sash fasteners—2481—E. K. Dutton.
Window sashes, &c.—2712—J. Syme.
Xyloidine, treating—2666—D. Spill.

Inventions with Complete Specifications Filed.

Blast furnaces or cupolas—2745—T. Prideaux.
Fibrous materials, spinning—2758—H. A. Bonneville.

Patents Sealed.

1019. W. Tatham & W. T. Heap.
1021. J. G. Tatters.
1022. T. B. Marshall.
1036. T. H. Lucas.
1040. C. E. Brooman.
1041. J. Drew, E. Southwell, and H. White.
1042. W. Henderson.
1043. J. Barker.
1048. W. T. Henley.
1049. W. T. Henley.
1052. C. E. Brooman.
1053. G. Little.
1059. H. Forbes.
1060. A. Morel.
1061. T. Redmayne and J. Sibrey.
1070. W. C. Cambridge.
1103. J. Jobson.
1132. J. S. Brookes.
1207. J. W. Burton.
1239. M. A. F. Mennons.
2134. W. R. Lake.
2191. W. R. Lake.
2214. W. R. Lake.
2345. J. Peacock.

From Commissioners of Patents' Journal, October 8th.

Patents Sealed.

1057. W. N. Wilson.
1062. F. Waller.
1066. J. R. Napier and W. J. M. Rankine.
1071. F. G. Fleury.
1072. A. C. Kirk.
1075. S. Smith.
1076. S. Barlow and T. Edmeston.
1079. J. Higgins and T. S. Whitworth.
1080. W. Clark.
1081. G. Slater.
1093. C. H. Gardner and J. Bickerton.
1096. W. Clark.
1098. R. Shortrede.
1106. R. S. M. Vaughan and A. G. Harston.
1107. C. Crockford.
1111. A. A. Langley.
1127. T. W. Gray.
1128. W. Weild.
1136. A. N. Wornum.
1137. W. Cochrane.
1138. T. Horsley.
1160. J. Atkinson.
1183. J. Haworth.
1377. W. E. Newton.
1548. G. Howard.
1931. J. Somerville & R. Elsdon.
2199. J. B. A. Menage.
2279. R. H. Michell.

Patents on which the Stamp Duty of £50 has been Paid.

2424. W. Clark.
2569. J. Zeh.
2442. G. T. Bousfield.
2540. O. L. Hopson and H. P. Brooks.
2473. C. Chapman.

Patents on which the Stamp Duty of £100 has been Paid.

2429. D. Cope.
2460. J. Ramsbottom.

Registered Designs.

4880—September 11th—A double-acting field or other gate or door latch—W. Baylis, Wolverhampton.
4881—September 12th—Handkerchief box—H. Malier, Belfast.
4882—September 13th—Gas cooking apparatus—S. Leoni, 34, St. Paul's-street, New North-road, N.
4883—September 16th—Metallic bedstead—J. Wadsworth, Birmingham.
4884—September 17th—Metallic bedstead—Key and Hoskyns, Brodsley, Birmingham.
4885—September 23rd—A gentleman's paper or paper-cloth collar—C. Potter, Milk-street, E.C.
4886—September 23rd—Leather strap or band—Dr. Millar, M.D., Gloucester House, Southsea.
4887—September 24th—Rack pulley—H. Frantry, Birmingham.
4888—September 25th—Clip or banner screen arm and other articles—T. Pemberton and Son, Birmingham.
4889—September 28th—A ladies' collar—R. Young, Cripplegate-buildings, City, E.C.

Journal of the Society of Arts.

FRIDAY, OCTOBER 18, 1867.

Proceedings of the Society.

Memorial Tablets of Great Men and Events.

In order to show how rich the metropolis is in the memory of important personages and events, which it would be desirable to mark by means of tablets on houses, the Council have caused an alphabetical list to be prepared, the third part of which is now inserted. Other parts will follow. The Council request the assistance of members of the Society in completing and correcting this list, especially with reference to dates and the insertion of other names.

Whilst the Council intend proceeding with this work, they desire also to see it carried on by others—either by corporate bodies or individuals—and the Council will be happy to be instrumental in procuring suitable tablets from the manufacturers.

Eldon, John, Earl of, Lord Chancellor (b. 1751—d. 1838); a templar. Cursitor-street (No. 9 ?), Chancery-lane, was what he called his first lodge, and from here, in early life, he told his secretary he had often ran down to Fleet-market with 6d. to buy sprats for supper. He lived in No. 6, Bedford-square from 1804 to 1815, and here occurred the memorable interview between him and the Prince Regent, afterwards George IV. The latter was determined to have his friend Jekyll, the great wit, appointed to the vacant office of Master-in-Chancery; this Lord Eldon rejected. To accomplish his purpose, the Prince walked straight into the Lord Chancellor's bed-room, when ill in bed, and requested him to do as he wished; on being at once refused, he stated his intention of staying where he was till the appointment was made, the prince pitying the chancellor because he would never see his wife again. He built the house at the corner of Hamilton-place, Piccadilly, which was his last London residence. A portrait of him hangs at Merchant Taylors' Hall, and another in the gallery at the Privy-garden, Whitehall.

Elizabeth, Queen (b. 1533—d. 1603); dined at the "King's Head," No. 53, Fenchurch-street, off pork and peas, after attending service at All-Hallows-Staining, Fenchurch-street, on her release from the Tower. The metal dish and cover she is said to have used are still preserved; lived, when a girl of 13, in the same house, in Chelsea, with Queen Katharine Parr and her second husband, Thomas Seymour, the Lord Admiral, afterwards beheaded; also lived in Durham-house, Strand, which was granted to her by Edward VI.; opened the Royal Exchange in person, January 23rd, 1570, and on that occasion dined at Sir Thomas Gresham's house in Bishopsgate-street; was present at the house-warming in Sir Robert Cecil's house (Salisbury-house), on December 6th, 1602; she died at Richmond, and her body was brought with great pomp, by water, to Whitehall; was buried, and there is a monument to her memory in Westminster Abbey. The statue of her over the Fleet-street doorway of St. Dunstan's-in-the-East is the only known relic of any of the old City gates, and stood in the west front of Ludgate, Temple-bar not being a City gate, but only a bar to mark the liberties of the City.

Ellesmere, Thomas Egerton, Lord, Lord Chancellor (b. 1616—d. 1700); lived in York-house, Strand; was a student at Lincoln's-inn.

Ellis, George Agar, Lord Dover; lived at Melbourne-house, Whitehall, now known as Dover-house.

Ely, Bishops of, Ely-house; 37, Dover-street, Piccadilly, is the London residence of the Bishops of Ely; Ely-place, Holborn, occupies the site of their "hostell," or ancient town house.

Empson, Henry VII. Emissary; lived in Walbrook, "in a fair house with doors," leading into the garden of the Prior of Tortington, now Salter's-garden.

Erskine, Thomas, Lord, Lord Chancellor (b. 1750—d. 1823); he commenced life as a sailor, then became a soldier for three years, and then studied the law; student at Lincoln's-inn; lived at No. 36, Lincoln's Inn-fields, in 1805. A statue of him stands in Lincoln's-inn Hall.

Ethelbert, King of Kent (b. 616); founded St. Paul's Cathedral.

Etty, William, R.A. (b. 1787—d. 1849); painter; lived at No. 14, Buckingham-street, Strand, from 1826 to within a few months of his death.

Eugene, Prince (b. 1663—d. 1736); stayed at Leicester-house when on a secret mission to England for the purpose of preventing peace between England and France.

Evans, John Rev., the astrologer; lived in Gunpowder-alley (No.—?), Shoe-lane; it was here that he gave William Lilly his first lesson in astrology.

Evelyn, John (b. 1620—d. 1706); was a templar; lived about nine doors up on the east side of Dover-street, Piccadilly; lodged at the "Three Feathers," in Russell-street, Covent-garden; took a house in Villiers-street (No.—?), York-buildings, Strand, in order to educate his daughters; was taken prisoner in Exeter Chapel, Strand, for attending service on Christmas day.

Fairfax, Sir Thomas, afterwards Lord (b. 1611—d. 1671); the Parliamentary general; married at the parish church, Hackney; lived in Great Queen-street (No.—?), Lincoln's Inn-fields; also in York-house, Strand, which was given to him by Cromwell.

Faithorne, William (d. 1691); engraver; lived at the sign of the "Ship" in the Strand, next to the "Drake," without Temple-bar; died in Printing House-square, Blackfriars, and was buried at St. Anne's, Blackfriars.

Falmouth, Lord; lived at No. 2, St James's-square.

Fane, Colonel (temp. George I.); one of the first inhabitants of Hanover-square.

Fanshawe, Sir Richard (b. 1608—d. 1666); lived in Boswell-court, Fleet-street; also on the north side of Lincoln's Inn-fields.

Farnaby, Thomas (d. 1647); schoolmaster; kept his school in Goldsmith's-alley, or Goldsmith's-rents, Cripplegate. He is described by Wood as the chief grammarian, rhetorician, poet, Latinist, and Grecian of his time. "His school was so much frequented, that more churchmen and statesmen issued thence than from any school taught by one man in England."

Ferguson, James (b. 1710—d. 1776); the astronomer; lived at No. 4, Bolt-court, Fleet-street, where he died. Buried at the churchyard of St. Marylebone.

Feversham, Lewis de Duras, Earl of (b. 1709). He commanded King James the Second's troops at the battle of Sedgemoor. Lived in St. James's-square (No.—?), and was buried in St. Mary-le-Savoy.

Ffolkes, Richard (temp. Charles II.); lived in Newport-street (No.—?), Long-acre.

Fielding, Sir John (d. 1780); one of the originators of the Magdalen Hospital, St. George's-fields, and the Marine Society; lived in Bow-street (No.—?), and was buried at St. Luke's, Chelsea.

Fielding, Henry (b. 1707 d.—1754); dramatist and novelist; lived in Bow-street (No.—?).

Finett, Sir John (circ. 1656); author of "Finetti Philoxenis—some Choice Observations touching the Reception, Precedence, &c., of Foreign Ambassadors in England;" lived in St. Martin's-lane (No.—?), Charing-cross.

Fisher, Kitty; the celebrated courtezan; lived in Carrington-street, May-fair (No.—?), about 1779.

Fitz-Alwyn, Henry, first Lord Mayor, and mayor for upwards of 24 years, and a goldsmith of the guild; lived "in a very fair house" on the north side of the church of St. Swithin, London-stone, Cannon-street; he was commonly called Henry Fitz Alwyn of London-stone.

Fitzroy, George, Duke of Northumberland (b. 1665—d. 1716); lived in St. James's-square.

Flatman, Thomas (b. 1633—d. 1688); poet and miniature painter; lived and died in Three Leg-alley (No.—?), (now Pemberton-row), Fetter-lane; he was buried in St. Bride's, Fleet-street.

Flaxman, John (b. 1755—d. 1826); sculptor; lived in New-street, Covent-garden (No.—?), from 1771 to 1772; from 1781 to 1787 at No. 27, Wardour-street, Oxford-street; and also at No. 7, Buckingham-street, Fitzroy-square, from 1796 to his death; buried in the burial-ground attached to St. Giles-in-the-fields.

Fleetwood (temp. Queen Elizabeth); Recorder of London; lived in Bacon-house, off Cheapside.

Fleetwood, Charles (b. 1692); Lord Deputy; lived in Wallingford-house; was Oliver Cromwell's son-in-law; buried in Bunhill-fields burial-ground.

Florio, John, author of the well-known dictionary that bears his name; lived in Shoe-lane (No.—?), Fleet-street.

Ford, Parson (b. 1731); died at the "Hummums," in Covent-garden, formerly a bagnio, now an hotel; it was really believed, for a long time, that his ghost appeared to a waiter in the cellar of this house.

Foster, Mrs., Milton's grand-daughter; kept a chandler's shop in Pelham-street, Spitalfields.

Foubert, Monsieur (circ. 1683); the riding-master; lived in Brewer-street, Golden-square, in 1683; Foubert-place derives its name from him; also, Foubert's-passage; young Count Königsmarck, so deeply implicated in the murder of Mr. Thynne, was a pupil in M. Foubert's academy in London.

Fox, Charles James (b. 1749—d. 1806); the statesman; lived in Albemarle-street, "on the left hand a little way up as you go to St. James's-street;" also for a short time in Arlington-street; Godolphin House, in the stable-yard of St. James's Palace (pulled down to erect Stafford House), was his last London residence. He is buried, and has a monument to his memory, in Westminster Abbey.

Fox, George (b. 1624—d. 1691), the founder of the Quakers; preached in a chapel up a narrow court opposite the old-fashioned gate leading to St. Edmund-the-Martyr. Died in the house of Henry Goldney, in Gracechurch-street (No.—?). He is buried in Bunhill-fields burial-ground, but no monument has been erected to his memory.

Fox, Stephen, 2nd Lord Holland (1774); built and lived in the mansion in the centre of the Albany, Piccadilly, and sold it to the 1st Viscount Melbourne.

Fox, Henry Richard Vassal, Lord Holland, (b. 1773—d. 1840), the famous Whig; lived at Holland House, Kensington. "He called on Lord Lansdowne a little before his death and showed him his epitaph of his own composing: Here lies Henry Vassal Fox, Lord Holland, &c., who was drowned while sitting in his elbow chair." He died at Holland House, in his elbow chair, of water in the chest. There is a monument to him in Westminster Abbey.

Francis, Sir Philip (b. 1740—d. 1818); one of those to whom the letters of Junius were ascribed; was educated at St. Paul's School, and lived in 14, St. James's-square. Lady Francis lent this house to Queen Caroline, who lived here during the first proceedings of her trial.

Franklin, Benjamin (b. 1706 — d. 1790); printer, philosopher, and statesman. He worked in Palmer's printing office as a common journeyman printer, and assisted in setting the type for the second edition of "Woolaston's Religion of Nature," and "continued," he says, "at Palmer's nearly a year;" during this time he lodged in Little Britain, next to a bookseller of the name of Wilcox; he also lived at 7, Craven-street, Strand, and was employed as a journeyman printer at Watts' office, Lincoln's Inn-Fields, in Duke-street, Lincoln's Inn-fields, opposite the Roman Catholic Chapel.

Frederick, Sir John (d. 1757); his mansion was in Frederick-place (No.—?), Old Jewry, which derives its name from him. This house was used after his death, till 1768, as the London Excise Office.

Fuller, Isaac (1672), painter, painted the sign of the Sun Tavern, behind the Royal Exchange. He was largely employed in painting the great taverns of London, particularly the "Mitre," in Fenchurch-street.

Fuller, Thomas (b. 1608—d. 1661); author of "The Worthies;" lived in chambers in Sion College, London-wall while collecting materials for his "Church History;" his book is dated from here. He was also lecturer at the Savoy.

Fuseli, Henry, R.A. (b. 1741—d. 1825); lived at No. 13, Berners-street, Oxford-street; also at No. 100, St. Martin's-lane, from 1784 to 1785; and at 72, Queen Anne-street East, Cavendish-square (now Foley-place), between 1788 and 1792. He was buried in St. Paul's Cathedral.

Gainsborough, Thomas (b. 1727—d. 1788), the artist; lived in the western wing of Schomberg-house from 1777 to 1783.

Galt, John (b. 1779—d. 1839), the novelist; lived at 34, Tavistock-place, Tavistock-square.

Gardiner, Stephen, Bishop of Winchester (1555), lived at Winchester-house, Southwark, in great style, having a number of young gentlemen of family as pages, whose education he superintended. He used the Lady Chapel, at St. Saviour's, Southwark, as a consistorial court.

Garraway, Thomas (circ. 1650); founder of Garraway's Coffee-house in Exchange-alley, and was the first who retailed tea in leaf and in drink, and may almost be considered the founder of the present system of tea-drinking.

Garrick, David (b. 1710—d. 1779), actor; was living in 1745 in King-street, Covent-garden, in his lodgings at Mr. West's, cabinet-maker; also in Mansfield-street, Goodman's-fields-street, during the term of his first engagement in London; also in 27, Southampton-street, Strand, before he removed to No. 5, The Terrace, Adelphi, in 1772. In this house he died. He frequented the Bedford Coffee-house, under the Piazza in Covent-garden; and also St. James's Coffee-house, St. James's-street (no longer standing). He made his first appearance on a London stage in Goodman's-fields Theatre, as Richard III. He is buried, and a monument erected to his memory, in Westminster Abbey.

Garth, Sir Samuel (b. 1665—d. 1718), author of the "Dispensary;" lived on the east side of the Haymarket, the sixth door from the top, from 1699 to 1703. He was one of the thirty-nine members of the Kit-Kat Club.

Gascoigne, George (circ. 1537—d. 1577), poet; lived in Gray's Inn, where he was a student.

Gay, John (b. 1688—d. 1732), poet; his "Beggar's Opera" was first produced at Lincoln's Inn-fields, and played 62 nights in one season. He was buried, and a monument erected to his memory, in Westminster Abbey.

George, Prince of Denmark (b. 1653—d. 1708), Queen

Anne's husband; was Lord High Admiral from 1702 to 1708, one of the exceptions to the rule that this office has been held in commission since the Revolution of1688. He was married in St. James's Chapel, St. James's Palace, and died in Kensington Palace.

Gerard, Charles, Lord, afterwards Earl of Macclesfield (d. 1694), lived in Gerard-street (No.—?), Soho; also in Newport-street (No.—?), Long Acre.

Gerarde, John (b. 1545—d. 1607), the herbalist; lived in Holborn; used to collect specimens, particularly water violets, in St. George's-fields, also in Mile-end, Whitechapel. He makes the earliest mention of Piccadilly.

Gibbon, Edward (b. 1737—d.1794), the historian. He was educated at Westminster School; was a member at Almack's Club; afterwards M.P. for Liskeard; lived in No. 7, Bentinck-street, Manchester-square, where he wrote a large portion of "The Decline and Fall of the Roman Empire," and the whole of his Defence of his noble history. He also resided at No. 76, the corner of Little St. James'-street, where he died. This spot is now part of the site of the Conservative Club.

Gibbons, Grinling (b. 1648—d. 1721), carver in wood; was born, it is said, in Craven-street, Strand, then called Spur-alley, but this is very doubtful. He lived in Belle Sauvage-court (No.—?), Ludgate-hill, and also in a house about the middle and east side of Bow-street, Covent Garden, where he died. This house was distinguished by the sign of "The King's Arms." He lies buried in St. Paul's, Covent Garden.

Gifford, William (b. 1755—d. 1826), editor of "Ben Johnson" and the "Quarterly Review," and author of the "Baviad and Maviad," &c.; lived and died at No. 6, James'-street, Buckingham-gate. At the shop of Wright, the bookseller, in Piccadilly, Gifford assaulted Peter Pindar, and got the better of him in the struggle. He lies buried in Westminster Abbey.

Gilliver, Lawton, bookseller; lived at "Homer's Head," against St. Dunstan's Church, Fleet-street.

Gloucester, H.R.H. Wm. Henry, Duke of (b. 1743—d. 1805); lived in Gloucester-house (now Grosvenor-house), Upper Grosvenor-street, Grosvenor-square; also in Leicester-house, Leicester-square, in 1766.

Glower, Richard (b. 1712—d. 1785), author of "Leonidas," an epic poem; lived at 11, James-street, Buckingham-gate; also on Lawrence Poultney-hill, Cannon-street, City, and at Albemarle-street, Piccadilly, where he died.

Godfrey, Colonel Charles, lived in Great Windmill-street, Piccadilly.

Godfrey, Sir Edmundsbury (b. 1678), the famous Protestant martyr; lived in Green's-lane (No.—?), Strand. He was a wood merchant here, and had his wharf at the bottom of Hartshorne-street, Charing-cross, now called Northumberland-street. He is said to have been murdered at Somerset-house, Oct. 17th, 1778, and his body taken and thrown into a ditch near Primrose-hill. There is a monument to him in Westminster Abbey.

Godwin, Mary Wolstoncraft (b. 1759—d. 1797), authoress of the "Vindication of the Rights of Women." She was the first wife of William Godwin, and mother of Mrs. Shelley. She lived at the "Polygon," Somer's Town, where she died, and lies buried at St. Pancras-in-the-Fields.

Godwin, William (b. 1751—d. 1836), author of "Caleb Williams;" lived at the "Polygon," Somer's Town, which is now surrounded by Clarendon-square. He kept a bookseller's shop for several years, at 41, Skinner-street, Holborn, and lies buried with his two wives at St. Pancras-in-the-Fields.

Proceedings of Institutions.

Yorkshire Union.—*Northallerton Mechanics' Institution.*—The annual *soirée* of this Institution was held recently in the Court House (kindly lent by the justices of the North Riding), which was crowded in every part. The chair was taken by Lord Teignmouth. From the report it appears that the Institution is in every respect flourishing.—The Chairman, after directing attention to the work carried on in the Institution, spoke in strong terms of the evil effects of combination among the working classes; but, so great was his confidence in the loyalty of Englishmen, he doubted not working men would soon emancipate themselves from the intrigues of evil disposed ringleaders.—Mr. Henry H. Sales, while agreeing with the remarks of the chairman, pointed out the coldness and want of sympathy for workmen too often manifested by employers, who forgot that capital and labour had other duties besides the payment and receipt of the weekly wage.—Dr. Walton, jun., commended the social features of the Institution to the non-members present. —Other gentlemen having spoken, the proceedings, which had been enlivened by the excellent singing of the local choral society, were brought to a close. *Seacroft Working Men's Institute.*—A meeting of the inhabitants of Seacroft was held in the parish school-room, on Thursday, October 10th, to take into consideration the establishment of an Institute in the village. The Rev. H. J. Lorysdon, M.A., occupied the chair. After much discussion, it was unanimously resolved that the establishment of an Institute, with a reading-room, library, and lectures, was desirable, and would meet with good support. The Chairman then called upon Mr. Henry H. Sales to specify the best mode of action. A committee was afterwards appointed to canvass the village for members, and to immediately commence a Working Men's Institute, the name being chosen in preference to the usual name, Mechanics' Institute, inasmuch as but few mechanics are resident in the district. *Hebden Bridge Mechanics' Institute.*—The annual *soirée* and distribution of prizes and certificates took place on Saturday evening, in Messrs. Crossley's mill, kindly lent for the occasion. The chair was taken by the president, H. Horsfall, Esq. The annual report was of a satisfactory character, the number of members being 152 in 1866, against 138 in 1865. The classes were in an efficient state, due, in the opinion of the committee, in no small degree to the valuable scheme of examinations of the Society of Arts and the West Riding Educational Board. The Rev. J. B. Lockwood, the Rev. T. Wilkes, Mr. Sales, and other gentlemen, addressed the meeting, which was very numerously attended by factory operatives. Songs, glees, and recitations, together with instrumental music, made the gathering pass off most successfully.

MUSICAL EDUCATION.

At the Church Congress lately held at Wolverhampton, the Rev. Sir F. G. Ouseley and the Rev. Thos. Helmore read papers on the subject of Church Music. A report of them was published in the *Wolverhampton Chronicle*, as follows:—

The Musical Training of the Clergy.

The Rev. Sir F. Ouseley read a paper on this subject. He began by saying that he hoped the subject on which he was going to address them would prove one of sufficient intrinsic interest in itself to secure their attention. That great improvement had been effected in Church music during the past twenty years, was now a matter of common notoriety. Many causes had contributed to this. In part it had been caused by the increased knowledge and hearty appreciation by the people generally of what was good in it, and by what had been more particularly the growth of our time, and had shown itself all over the kingdom, the formation of choral associations, the holding of large concerts, and the great increase of singers amongst all classes. In part, too, it was owing to the improved state of education generally; and, in part, too, to the system which had of late years sprung up of special choral teaching. And he would here take the opportunity of

naming Mr. John Hullah, to whom the revival of our national music was mainly due. But there was a still higher cause than any of those he had mentioned which had led to the improvement of which he spoke, for it was improvement not merely of singing only, but of a heartiness in singing. A great deal was also due to the energy and zeal with which the clergy themselves had entered into that work, and it was to the parochial clergy that they must chiefly look for the carrying out of all improvements in the choral services of their parish churches. Sir F. Ouseley then went on to show that the practice of singing in connection with religious services had been handed down to us from the earliest times; for instance, our blessed Lord joined in the singing of hymns with his Apostles, and we were exhorted so to do in the Apocrypha, where the harpers were harping with their harps. Under these circumstances he might take it for granted that it was most desirable to improve our church music, but the question arose what ought to be sung, and the way of singing it. Clergymen were the natural leaders of church psalmody, and this should go hand in hand with the professional leader which it would be necessary to engage. There was, unfortunately, a great want of musical learning in candidates for holy orders, and in some persons there was a natural incapacity and a deficient ear for music, which no amount of training would ever supply. He was the last to say that the person in which such deficiency existed should be precluded from entering holy orders, for there were many other offices which he could perform, namely, preaching and visiting the sick, but under such circumstances the leading of the choir should be left to a more competent person, who should be carefully appointed. The rev. gentleman then went on to say, upon the authority of Mr. Hullah, that there were very few who were incapable of musical training, and then came the question how could this be brought into being. To this he would reply that more attention should be given to musical training in our schools. It was true that great improvement had been made in this respect in schools, but still the musical element among the humbler and poorer classes might be developed further with considerable advantage. It fell to his lot to examine the papers of the candidates for the middle class examinations, and in musical efficiency the average was low, and he was instructed to put the most elementary questions. He then proceeded to observe that in cases of cathedral choirs the youths should be trained by some college tutor, but not brought up to spend the remainder of their hours in idleness, and allowed to run the streets, thereby growing up, perhaps, efficient musical scholars, but devoid of those Christian principles which it was so essential should go hand in hand with knowledge. He also argued that the musical training should be more general in our universities, in order that clergymen might be better able to control, and take part in the services in our country churches with musical ability. The rev. gentleman concluded by throwing out the suggestion that music should form part of the examination for deacon's orders, not as a matter of necessity, but as an alternative subject; and concluded his paper amidst expressions of applause.

Church Music.

The Rev. T. Helmore next read an interesting paper on the subject of "Church Music," with musical illustrations by the choir of Lichfield Cathedral, with harmonium accompaniments. The reverend gentleman, after alluding to singing as a means of praise, and of following out the scriptural injunction to show our gratitude to and adoration of God, next referred to the carelessness evinced by many with regard to the proper cultivation of singing. In social life, although there was expressed liking for music, it was too often performed in an indifferent manner, to suit the carelessness of indifferent people. Music and singing had larger claims upon our attention than for the mere purpose of contributing to our amusement; they were a means by which we could praise and glorify God. For this purpose it was essentially necessary that both the clergy and the people should learn to sing, and should properly cultivate whatever talent for singing they might possess. They could not expect to hear good congregational music whilst there was not a man amongst them who could use his voice musically as a singer. He did not speak so much of females, because, as a rule, they could always sing better than men, perhaps from having greater facilities for it, greater sympathy, and more frequent opportunities of singing. He then advocated, at some length, the formation of singing classes in all our public schools, the extension of the system of choral teaching, and also the adoption of full choral services in all our parish churches, so as to increase the devotional feeling of the people, instead of confining such services, as had been the case hitherto, to our cathedrals.

ON RAILWAY REFORM IN CONNECTION WITH A CHEAP TELEGRAPHIC POST AND A PARCEL POST DELIVERY.*

By Edwin Chadwick, Esq., C.B., Correspondent of the Institut of France.

In an address which I gave before this Association in London, when I had the honour to fill the office of president of the department of economy and trade, and also in a paper which, by request, I read before the Society of Arts,† I submitted my views on the economical principles applicable to the reform of our railway communications. I endeavoured to show that railroads, like common roads, were usually profitable, often by the increased value given by them to adjacent land, though they failed to pay good dividends—as good common roads are usually profitable, though they may fail to pay for their construction and maintenance by tolls. I contended that all taxes on the means of intercommunication—that all exactions on them beyond the payments for construction and the services of working and maintenance, are wasteful, and among the worst of taxes. I maintained that, by the substitution of public or governmental for the private trader's security—by the economies derivable from unity of management, and by the relief from local as well as from general taxation, obtainable by putting the railways in their proper position as public roads—a large saving may be effected, sufficient to compensate the shareholders fairly, and to provide for reduction of fares and extended accommodation to the public.

On the motion of Sir John Pakington, that address was published, and I believe it served to promote the appointment of a commission of inquiry into the facts. That commission has recently made its report. By more impartial persons than I may pretend to be, that report is pronounced to be a failure. It has failed to meet the elementary propositions to which I have referred, or to elucidate them properly. It reports as its opinion "that it is inexpedient, at present, to subvert the policy which has hitherto been adopted of leaving the construction and management of railways to the free enterprise of the people"—meaning by the people, it is fair to presume, such private enterprisers as those who, by multiplied competing capitals wastefully applied, have brought our railways into the existing ruinous condition, by whose blunderings (not to speak of any plundering) a state of complicated evil has been produced, from which it is, "at present," needful to extricate it—for the avoidance of further waste and for the sake of the free enterprise of the people—meaning the whole people—in safe, convenient, cheap, and complete intercommunication. Lord Stanley has not signed the report. Neither has Mr. Roebuck signed it. Mr. Monsell has made a distinct and very

* Read at the meeting of the National Association for the Promotion of Social Science, at Belfast.

† *Journal*, vol. xv., p. 222. See also vol. xiv., pp. 34, 198, 276, 345, 378, 401, 462.

able report, especially on the railways of Ireland, and in opposition to the report of the majority of the commissioners. And, above all, Sir Rowland Hill has made an independent report, well sustained by evidence, on the whole question, very much in accordance with the views which I submitted to the Association.

We were led to expect a paper on the subject from Mr. Lloyd (the author of the celebrated Lloyd's bonds), who, upon Sir Rowland Hill's report, has stated that he has arrived at conclusions in the direction of those set forth therein, and was desirous to avail himself of some opportunity of expressing them publicly. I regret that he has been prevented giving us the benefit of the results of his very long and close experience for this meeting. From several persons practically engaged in large branches of railway administration I have received, privately, direct expressions of concurrence in the views I have set forth.

I now wish to direct attention to the present position of the question, and to some points specially applicable to it in Ireland, that have not, as I conceive, received the prominent position due to them. Before doing so, I must beg leave to make some observations on the Commission itself. I confess that I was somewhat surprised at its composition, in which the mistake appears to have been made, of assuming that the interests of railway directors and others, who have profited largely by the existing system, and who constitute the majority of the members of the Commission, were identical with the interests of the ordinary shareholders, who, as a class, have lost or been ruined by their management. It is a doctrine of Locke that in entering upon any question we should consider the state of our interests in respect to it. If I had made a fortune by the system in question, or belonged to a house which had received large sums on account of it, or had derived greatly augmented values of lands from it—if I owed my public position to it—if, indeed, I were a member of Parliament, responsible for the system by long acquaintance with it—I should have felt that my proper position would be that of a witness, or of an advocate, rather than of a judge upon the system. Immediately the composition of the Commission generally was seen, the directorates and private enterprisers were at their ease upon it, and their confidence was early confirmed by the course of its investigations.

So great a subject can only be dealt with satisfactorily by undivided attention, and by local investigations, and where the Commissioners are themselves unable to give it, that attention must be given for them by competent assistant Commissioners. It was due to the manufacturing interests in the great centres of industry, that complaints should be heard locally, and that the shareholders, as well as the public, should be locally informed, by proceedings on the spot, as represented by the Mayor of Dublin, and this has not been done.

These are no after-criticisms, for I remonstrated to the Commissioners themselves on the imperfection and unsatisfactory nature of their inquiries, amongst other things, in not inquiring closely into the gains derivable from unity of management;—in not examining closely, or at all, the important examples cited of cases where, under competition, extreme reductions in fares had been made good, or nearly so, by increased traffic, so as to determine what must have been the net result from the increased traffic, if it had occurred, as it might have done, under unity of management;—in not inquiring closely into the increased value of land created by the formation of railways, and justifying contributions from the land; —and in taking mere hearsay evidence, and not making direct inquiries into the governmental or public administration of railways on the Continent, which Mr. Robert Stephenson, Mr. Locke, and other witnesses, practically conversant with them, had cited as examples to be followed.

The report of the commissioners, in depreciation of those examples of the foreign railways compared with those of England, parades the greater numbers of the English trains; omitting to notice how many of these are duplicate, and even triplicate, competing trains starting from the same points to the same points, at nearly the same times, with carriages habitually only one-half, or even one-third, full;—as on the line between Manchester and London—three capitals, for the performance of a service that might, under proper management, be better performed by one; involving, as has been shown in relation to that one line, a waste of some quarter-of-a million annually, in mileage alone. We impeached the present system for waste. The Commissioners appear to have seen no significancy in such large confirmatory facts and testimony as the following of Mr. C. E. Stewart, for twenty years secretary of the London and North Western Company, who, lamenting the losses by disunion, states, by way of illustration as to one of the three companies, that "The number of passengers booked during two days from the Euston Station, on the 12th and the 13th of September, 1861—which I believe may be taken as an average—was 4,482, and for the accommodation of those passengers there were sent away trains containing seats for 13,512 passengers." Then with regard to the up traffic on those two days, "4,336 passengers arrived at the Euston, and there were seats for 13,333 passengers!" Then as to goods, he says, "The general managers will tell you that very often a waggon is sent off with a quarter of a ton, which is capable of carrying four or five tons; I believe the general average which is sent off in a waggon is not more than one and a half to one and three quarter tons." On such facts he estimates the saving derivable from unity of management if the companies "would only work harmoniously." At present, as the director of one of the largest companies declared to me, half their time is consumed by hostilities with each other.

The state of information of the commissioners on the general condition of the subject matter of their inquiry is indicated by the following questions from two of the commissioners—railway directors (put in April, 1866)—to another railway director, late a director of the Great Eastern Company.

"*Chairman* (to *Mr. Bidder*)—Are there any railway companies in England which are not able to pay their guaranteed preference stock?

"*Mr. Bidder*—They must be very small indeed.

"*Mr. Glyn*—Are there any instances of that sort at all?

"*Mr. Bidder*—I do not know of any. If there are, they must be very small indeed."

I might fill a volume with illustrations of their course of inquiry; especially of questions assuming as facts fallacies and interest-begotten prejudices; the answers to which would require the exposition of a system. I may, however, give one illustrative example, though that was of a commissioner who is not, that I am aware of, under any sinister interest in relation to the companies.

Mr. Galt had proposed that the reformed railways should be given over for working to the best bidders as responsible contracting companies.

7546. "*Mr. Lowe*—Do you not think that a company which had the power of sending several members to Parliament would be dealt with more leniently by the Government on whose side it returned members than a company which used its power the other way?

"*Mr. Galt*—If you give no option, if you make it binding, that you shall let the contract to whosoever gives the most money, there is no option left in the power of Government.

"*Mr. Lowe*—When you have once got the company, supposing the company is letting the permanent way go out of repair, would it not be dealt with more leniently by the Government if it supported the Government for the time being, than if went against it?

"*Mr. Galt*—If the Government break faith with the public, and act dishonestly, you can only go to Parlia-

ment for redress; you cannot provide against those things.

"*Mr. Lowe*—You cannot provide against the Government using its power for political purposes?

"*Mr. Galt*—If the Government chooses to act dishonestly, then all the power of the Parliament would be used to remedy that state of things.

"*Mr. Lowe*—Do you not think that a very good reason for not adopting the system you propose?

"*Mr. Galt*—I do not think so."

And so the examination goes on with a persistent assumption of an incurably rotten state of corruption on the part of the Government, and its impotency for the needed reform.

I beg to observe on the theories and facts assumed in these questions: First, that the administration of the railway directorates is generally unexceptionally pure and superior; in the next place that governmental administration under the existing constitution is generally inferior and thoroughly corrupt; that its corruption is an ultimate fact, which it passes any (his) legislative skill to remedy. That this is not an incorrect interpretation of the right hon. gentlemau's meaning, may be inferred from the fact that he has said much the same before, when, as Vice-President of the Privy Council, he rejected the proposal of the Education Commissioners for giving power to the Privy Council to reform educational endowments, and rejected it on the ground that in its exercise such a power must be politically jobbed; and again recently, when he declared himself for the purchase system, on the ground that "promotion by merit" must needs be, in this country—disregarding the fact that it is not so in France or in Prussia—"promotion by job." My answer on the legislative problem, of securities against jobbing in contracts, was by referring to those taken for supplies to the French army, from it being there, as I am assured, very completely resolved, that it is resolvable here. I must, however, repeat my denial of the fact assumed of the relative inferiority and greater actual corruption of governmental administration.

Now and then, and at long intervals, there has indeed been a cloud of suspicion upon a member of Parliament, a party man who has got into a changing political office; and there have been clouds upon inferior executive officers whose duty was to pass goods, and who were seen to live beyond their salaries or ostensible means. But of the chief permanent executive officers of departments, I never knew or heard of one who lived beyond his modest salary or his ostensible private means; and I do not believe that a purer set of officers will be found in Europe. Admitting that improved securities are needed in taking contracts, I believe I shall be warranted in the allegation that there is a very large amount of public expenditure on contracts in which no reasonable suspicion attaches, to which no fair objection can be made. But only think of a privy councillor repeating such pregnant inuendoes against the executive government of the country—imputing to it inferiority and less trustworthiness than the general railway administration, in which the instances are notorious of officers leaving depressed and ruined railways with immense fortunes! I beg to recal to recollection my declaration of my belief that no government of any party in this country could have existed under such gigantic mismanagement as has been displayed in the railway administration, in the courts of law, and in public investigations. Since then I am sorry to have beheld one vast verification after another of that declaration, in immense disasters, which have disgraced the country before Europe, and have shaken commercial credit everywhere and carried ruin into the families of the poor shareholders throughout the empire, who had been led by directorates to invest their savings in shares, which they were assured were as secure as the public funds. If what the right hon. gentleman says be true—if the Government be so corrupt that it can not be entrusted to make contracts for the public—if it be impotent to do what is requisite for the economy, freedom, and safety of the means of internal communication—to do what is done by other constitutional governments, and even by some despotic states on the Contitinent, it is surely a Government which, if it be not to be reformed, will not, in a social science point of view, be deemed quite deserving of his magniloquent glorification of it as an example of the perfection of legislative wisdom! Whilst progress is making in the physical sciences—under such political pessimism as the declarations cited imply, there can be no material progress in the science of legislation, or in public administration in this country.

Nevertheless, the inquiry has served to prove that the pecuniary gain to be derivable from unity of administration is very considerable. By the one practical and reliable witness, whose testimony I have cited, it is rated at twenty per cent. It is, moreover, clear that there is a large saving available on all debentures and debts, as put by Mr. Galt, of the difference in value, amounting to about one-fourth, from the substitution of private for public security. Thanks to Mr. Galt, to Mr. Monsell, and the public authorities of Ireland, the evidence has been made clear (and impartial persons would say decisive), for the resumption of the public rights and the recomposition of the governmental responsibilities in respect to the railways. Of the reductions obtainable by unity of management, as well as by the financial operations, there can be no reasonable doubt. Assuming it to be agreed that the reductions are to be made, the question is how the saving by them may be most equitably divided between the public and the railway shareholders. Here in Ireland, giving to those shareholders something who now receive nothing, and who have no reasonable prospect of receiving anything within a generation;—giving them what not directors but arbitrators in their interest would advise them to accept; giving for the railway property of Ireland, which, on a liberal estimate, is commercially valued at seventeen millions and three quarters, nineteen millions and a-half; the government or the public, borrowing money at 3½ per cent., would get that property for £634,560 per annum, which now yields a net annual profit of £900,592; making a gain of £266,032; added to which £120,000 is to be saved by unity of management—presenting a prospect of some total saving of £386,032 to compensate for the risks of considerable reductions of fares for passengers and rates for goods. Added to these estimated pecuniary savings, are very considerable savings in time by better fitting trains, a saving in cross districts in England estimated at one-third, without any alterations of rates of locomotive speeds. Railway shareholders in England may calculate for themselves the gains derivable from the like operation for their properties, and add to them a gain of about six and a-half per cent., by the reduction of local rates and public taxes, by placing the railways in their proper position as public highways. The government have taken the important step to ascertain, by a second commission for Ireland, what,—if the first commission had been impartially and competently directed, would have been in course of being determined for Great Britain,—namely, the exact financial condition of the railways, their actual receipts and expenditure for the last three years, and the present condition of the lines and the rolling stock, with a view to ascertain their actual value for a purchase.

I now beg leave to direct attention to two additional elements of utility and value, derivable from the course I have proposed,—especially with respect to Ireland.

In relation to a country in the condition of Ireland, chiefly agricultural, I would submit, as an administrative principle, that the extension of the means of communication and the improvement of the conveniences of transit should not be delayed for demand, but should precede demand; and if the operations be conducted

judiciously and economically, they will invite and stimulate use and create demand. In parts of Scotland and in England, where railways have been constructed from one distant point to another, through thinly-populated districts, without regard to intermediate traffic, or any expectation of it from those districts,—in such conditions the projectors have been sometimes vastly surprised by an amount of traffic exceeding the traffic estimates for the formation of the lines,—that has appeared to be extraordinary and unaccountable to them. Extraordinary augmentations have also occurred, surprising to railway managers, on the occasion of the extension of conveniences by reductions of fares.

But the greatest extensions of conveniences will be in the formation of branch lines, and I should anticipate, as in the United States of America, by the construction of light and cheap horse-railways. In and about American cities the extent of horse-railway appears to be about equal to railway for locomotives. These horse-railways are made with lighter rails, and at a comparatively cheap rate. If such railways, which give to one horse the power of more than three, be an economy within advanced farms or advanced manufactories, they will be an economy to carry produce from them to stations, as well as to markets. With due extensions, besides much new traffic created, much existing agricultural and other traffic will be gathered to the railways that now goes by cart or waggon. It is probable that the full extension of these branch lines would early equal in extent the main lines now in action.

Now the present condition of the railways, in the hands of private commercial companies, operates as a barrier to these most important and economical extensions throughout the country. In the first place, the companies' habits of expense are detrimental to such cheap extensions. Their extensions are made with the like weights of rails as their main lines, and much on the same scale in other respects. The companies, as private traders for a profit, are moreover subjected to exactions for land which could not be attempted if the branch lines were put, as they ought to be, on the footing of local bye-ways, and as a service without private profit. On looking over the maps, it will be perceived that branch lines are required for much country intermediate between the existing lines, under conditions in which they will appear to be, and may be made to be, auxiliary competing lines for one main line or the other, and therefore their construction is at present subjected to every sort of expensive obstruction.

On the whole, branch extensions, under the existing conditions of the railways, have generally proved to be a system of suckers on the trunk lines; whilst, if the public rights be resumed, and proper governmental duties be restored, and if the railways be put on their correct footing, as public highways, and the branches as local bye-ways, with available economies of construction and working, the whole system of branches may be made a great system of feeders.

The resumption of the public rights, and of the governmental duties in their behalf over the means of communication, would be of great importance, especially for Ireland, by removing obstructions to the utilisation of the postal establishments, and serving for the distribution of parcels and postal messages, as in Belgium and Switzerland.

In an administrative point of view, the postal service is intimately, indeed, essentially, connected with the railway service, and, in my view, which I think is impartial, ought to be predominant in it. The union of the postal service with the railway service would be a powerful means of regulating the punctuality of the railway trains, besides furnishing the means of collecting and distributing parcels, as well as telegraphic messages. As it is, the railway companies' mail-trains are generally the most punctual, and on that account are the most resorted to by business men; and they are made punctual by the governmental service of the post, which "fetches them up," and fines them for delay. But, as I showed in a paper read at the Society of Arts some time ago, on a parcel post system, that our pest has more than ten thousand stations, and now a force of more than twenty-five thousand persons for the performance of the public service. All the railway stations put together are, I believe, not above one-third of the number of the postal stations. The telegraph companies, as I have shown, have not more than about one telegraph station to every eight or nine of the post-office stations. The power of the distribution of small parcels and of telegraphic messages by the postal service may be said to be about eight or nine to one of the trading companies power. If a small parcel be required to be sent a mile or two from the railway station by the railway company, usually a railway porter must be sent with it, and the time of that porter must be charged on the one small parcel, though it may be but an ounce or two in weight. But on the system of postal distribution, it would form but a small addition to the handful of letters he has to carry. If the parcels were heavy or more numerous, they would be collected or distributed by the post-cart. I had to examine the subject with reference to postal telegraphy, for a paper prepared to submit to Mr. Gladstone on the question, when it was manifest that under the existing conditions, the companies could not extend their stations, with a fair prospect of profit, beyond their existing numbers; and for this reason, that the companies must have separate office rents, coals, candles, taxes, office-keeper, and messengers, for comparatively few messages, which will not pay the extra expense. The rent, and other expenses of the stations, as well as the services of the post station masters, are already paid for, and they would be compensated for the occasional additional service by a relatively small, but acceptable addition to their existing pay.

In the case of postal telegraphic messages, in a large proportion of cases, in rural districts, the postal service would, as I must remind you, reduce the distance and the time of delivery of the message by post messenger to one eighth or ninth of the labour and expense to which the private companies are now put. Thence it follows that by the utilisation of postal stations and services on a public footing, collections and distributions may be effected at low rates, quickly, and with a profit, which private companies, with their separate establishments, cannot effect at the same rates, nor, indeed, at much higher rates except at a loss.

In London, and in most places in England, to get a letter, and a telegraphic message sent, and a small parcel forwarded, application must be made at three different and commonly distant places. In Switzerland or Belgium, and other places on the Continent, you only go to one place, the postal station, which, in itself, is a great convenience and saving of time, especially when the tariffs are all well known. In Belgium, the uniform telegraph message has been reduced to half a franc, and the revenue has been replaced by it. In both countries the charge for the transmission of small parcels is very small. In Switzerland parcels of 12olbs. weight may be sent by post.

I may here state that the Belgian government, appreciating the importance of the cheapest and freest means of inter-communication, though their fares were of the lowest in Europe, have recently reduced them considerably lower. Their first-class trains, which were about three half-pence per mile for the express trains, they have reduced to less than three farthings, and their second-class to less than a half-penny. Thus the express fares from Brussels to Verviers, which is 86 miles, are—for the first-class 4s. 9d., for the second-class 3s. 2d.; whilst for the ordinary trains the fares are—for the first-class, 4s., the second, 3s., and the third, 2s. In England, the fares for express trains range from two pence half-penny to threepence per mile, and the second-class from three half-pence to twopence. As to the ordinary fares, take those here at Belfast. Take those

from Belfast to Carrickhugh, which is 82 miles—they are, first-class, 14s. 3d.; second-class, 10s. 4d.; third-class, 6s. 6d. Take an English line, for example, that from London to Rugby, which is 82½ miles; the fares are—first class, 15s.; second, 11s.; third, 6s. 10d. On the Belgian lines they charge extra for such luggage as the passenger cannot carry and put under the seat, which occasionally may make some slight difference in favour of the English lines, and in Belgium return tickets are less frequently granted. But what will all that come to? The time has been unfortunate for the change, as Belgium has partaken of the commercial stagnation prevalent in Europe, but the net revenue is in course of replacement from the bold and highly politic reduction, which, looking at the analogies of the population of the two countries, I regard as an encouraging example for Ireland.

The result of the utilisation of the public stations and the postal service in Belgium and Switzerland has been a considerable augmentation of traffic. In a few years the transmission of small parcels by post has been nearly doubled, and I believe now they are at an increasing rate of nearly five millions annually in Switzerland. In Ireland the number should be in the same proportion more than doubled, and the branch lines made more largely feeders to the main lines.

The effect of this system on trade in Ireland would be, as it has been in Switzerland, very powerful. It would enable traders to send for goods as they want them, and to diminish the expense of stocks. In Ireland, as in Switzerland, it would enable business to be transacted often with one-third the stocks that were heretofore found necessary.

In Ireland, however, I apprehend that the stocks in the village shops and the retail shops in general are, from poverty, very low. With them the results of cheap parcel post conveyance, and of a cheap postal telegraph, would be the reverse of that in Switzerland or Belgium. It would be to give them, in effect, indefinite augmentations of stock, by enabling them to send for goods fresh, and as they wanted them. It would also tend frequently to bring the producer directly in communication with the consumer, and to save the cost of intermediate agents. In several of the continental states there are large beneficial results in progress in these directions, which here in Ireland, as well as in England, are arrested—I say, unavoidably arrested—by the condition of railway communication in the hands of disjointed and conflicting companies.

The railway commissioners could not well avoid noticing the complaints made of the uncertain and conflicting rates and the imperfect delivery of parcels, and they say:—"Looking at the extent to which the railway system has now reached, the time has arrived when railway companies should combine to devise some rapid and efficient system for the delivery of parcels." They might have added the word "economical" delivery, and also some rapid and efficient system for the collection of parcels.

When I represented the great extent of the ground for which new branch railways were needed, and of the capillaries of the system of internal communication which required to be improved, speeded, and utilised, I did so from impressions derived from passing observation. But the distinct statistical evidence of the extent of the postal system of deliveries, or of those capillaries which they advise the railway companies to rival, was put before the commissioners, by the evidence of Mr. Page, from the post-office, and it is this: The number of miles which mails are conveyed daily by railway in the United Kingdom is 49,700, and, beyond these, the number of miles which mails are conveyed daily, by coaches, mail-carts, and omnibuses, is yet 33,000, whilst the number of miles travelled by the rural post messengers is 72,000 miles daily, or nearly as much as all the mileage of railways and mail coaches put together. Could the commissioners have minded these facts, or have heeded what they were proposing, when they proposed that the railway companies should undertake the delivery of parcels—impliedly as equivalent to the plan proposed of a postal delivery—*i.e*, that the railway companies should undertake the separate service of parcel delivery by separate means, equivalent to this thirty-three thousand miles of postal delivery, by coach or mail carts daily, or the daily postal delivery of seventy-two thousand miles by foot, to be provided and paid for separately? In Ireland, however, it stands thus, and I adduce the fact for particular attention; whilst the daily conveyance, by mail coaches, carts, &c., is 8,277 miles, and by foot messengers 8,680 miles daily, by railway, according to the last returns, it was only 4,645 miles daily. That is to say, they were recommending to the existing companies the formation of a triple number of stations for collecting and delivering parcels, multiplied offices and services, clerks, &c., as well as carts—an extra expense for them which must, if charged on the parcels, to a great extent be prohibitory.

In Ireland there are sixteen hundred and more postal stations. I have not at hand the number of railway stations. But, as some electric telegraph company directors maintain the same doctrines against the utilisation of public establishments for the public service, in exemplification of its fallacy, I may mention that, while there are 1,625 postal stations, there are only 92 telegraphic stations in Ireland. In other words, the telegraph stations are to the postal stations in Ireland as one to seventeen. If the public are determined to utilise their postal establishments, as I trust they will be, the trading companies must, in Ireland, have sixteen more separate establishments to compete with them—a supposition that is absurd. Are, then, the sixteen places, sixteen towns or villages out of seventeen to be deprived of the benefit of quick and cheap intercommunication by message, that the monopoly of a trading company, and its power of making exactions on their necessities, may be maintained?—a supposition that, as a question of legislation and administration, is also absurd.

In Ireland, where, on the principle I have stated, conveniences ought to be in advance of demand, the proportion of post-offices to the population, which ought to be the same, is less than in England. The combination of the postal with the railway and the telegraphic services may serve to make them equal at reduced cost. In Ireland there is only one postal station to some 3,700 of the population. It is stated to be part of the post-office plan to extend postal telegraphy only to places having a population of 5,000 persons. This can only be accepted as, in the first instance, a tentative extension. In Prussia, which is in many respects the best administered country in Europe, in which the government well knows what it is about, it has been officially announced that the government intends to extend the telegraphic system to every place with a population of 1,500 persons, or nearly double the extent of our postal stations.

On the public footing there are other large branches of service for which the telegraph is needed, and which should contribute to the establishment charges, in reduction of those for the telegraphic post.

As a commissioner of inquiry into the organisation of a police force, I can state that by a complete system of telegraphic communication from station to station, and in combination with a general postal system, the efficiency of the police force may be nearly doubled. If I recollect rightly there are upwards of 1,300 police stations in Ireland. Then there are the coast-guard stations, and the Royal and mercantile marine stations, and all the military stations, which need connection; and all these will bring telegraphic communication closer than the existing telegraphic stations. The statement made by the Minister of War for Belgium declared that placing the railway under public control had doubled the efficiency of the army, and that the electric telegraph would double it again, and this is, I submit, especially applicable to Ireland. I am assured, upon good authority, that by a recent invention by Mr. Donald Nicoll, underground

telegraphs may be laid down and maintained as cheaply as the present system of overground telegraphs.

The opposition to the utilisation of the public establishments for the public service by postal telegraphy, is similar to the opposition to the utilisation of the establishments for the distribution of parcels, and to the utilisation of the public highways for railway communication under unity of public management as a service. I beg to notice some of the grounds put forward in opposition to postal telegraphy.

In the paper which I read at the Society of Arts, I stated that "Under the existing conditions of dearness and great incompleteness in England, the telegraph may be said to be a mere class telegraph, in regular use only for stock brokers, produce brokers, and the higher classes of professional men. It cannot be called a domestic or a general public telegraph. For domestic use it is generally only available to the very-well-to-do classes—the few. For the higher middle classes its use is confined chiefly to extraordinary occasions, to death, to mortal sickness, or to impending calamities. So much is this so even amongst wealthy families, that at first a telegraphic message often gives, before the message is read, a shock of alarm, that something sad has happened, and is to be communicated. To the many, to the lower middle classes in towns, to the wage classes in towns, as also to the agricultural classes, the present charges may be said to be entirely prohibitory."

In the course of an answer to my paper made by Mr. Grimston, the chairman of the International Telegraph Company, he thus states the limits of the present use of the telegraph, as a ground for doubting the amount of the returns obtainable from its extended use as part of a public postal system, and he states, as a proof of his assertion, "that the gross receipts of the Electric Telegraph Company, in the year 1866, amounted to £324,537 17s. 9d., of which 75 per cent. was taken at 15 stations, 22 per cent. at 77 stations, and 3 per cent. at the remaining 1,157 stations." As a further proof he says:—"I may add that half the money taken at the 15 large towns was received in London, a quarter in Liverpool and Manchester, and the remainder at 12 other large towns." And hence he assumes that telegraph stations in minor or rural districts will not pay.

This, I submit, is entirely in accordance with my preceding statement as to the limited use of the private commercial telegraph, the charges for which are increased, by extended post messengers in the rural districts, just at the point where they ought to be diminished. If the commercial telegraphs were so extended to equal the seventy-two thousand miles of the postal daily foot deliveries, by separate commercial establishments, and at the tariffs requisite to pay for them, it would be, as in the case of the railways, an extension of system of powerful and exhaustive suckers; whilst by the cheap utilisation of the public establishment, and appropriate low charges and extended conveniences, the postal telegraph stations properly administered will become part of a system of feeders.

Mr. Grimston takes upon himself to say that the post-office clerks "have duties quite sufficient to occupy their time without undertaking the work of telegraph clerks, for which they are utterly unfit." He says that, "the persons employed at post-offices in small country towns and villages are quite unfit to be telegraph clerks. Telegraph clerks must commence young, and receive a regular training before they become efficient manipulators, and in practice it has been found that persons over 25 years of age learn the telegraph very slowly, and scarcely ever attain to thorough efficiency." Can this chairman of a large telegraph company be really unaware of the fact, that there are a number of village postmasters who do now act as telegraph clerks for companies, and that they are among the most intelligent and successful—more successful than the common railway porters, by whom a large proportion of the telegraphs throughout the country are worked; — that whilst some instruments are difficult to use, there are other instruments so simple and easy to be learned, that their use is acquired in a week or a fortnight by old people, as well as by young; and that they are readily worked by common shop lads in private commercial establishments? The knowledge of Mr. Scudamore of the telegraph service, and the means of applying it, is, it would seem, better than that of Mr. Grimston, as to the postal service and its capabilities.

The Chairman of the International Telegraph Company sums up the grounds of his opposition to our measure in the following propositions:—1st. "That the extension to any considerable number of small towns and villages would cause an annual loss to the State instead of a profit." That is to say, I presume, that it would cause a loss, by dispensing with separate establishment charges, of office rents and services, and by reducing the length and expense of post messages in England from some eight to one, and in Ireland from seventeen to one, and by using, occasionally, the postal foot messengers for deliveries to these reduced distances. 2nd. "That village postmasters and postmistresses are totally unfit to work the telegraphs." To my answer already given that they are found to be as fit or even more fit than railway porters, I will add that Captain Bolton, of the Royal Engineers, says, "I will undertake to instruct, in the brief space of half-an-hour, any postmaster or postmistress of any country station, who can read and write, to correctly send and receive a telegraphic message by my system." 3rd. Mr. Grimston says "That the delays inseparable from the system proposed for sending out messages would be very great;" *i.e.*, especially in the rural districts where the postmasters, from the comparatively small amount of their business, have the least interruption, and where, as I have stated, the distance and the time of the foot messages in England will be reduced to one-eighth and in Ireland to one-seventeenth. 4th. "That the consolidation and amalgamation of the existing telegraphic companies could, for the reasons already given, be much better effected by the companies themselves, supposing an Act of Parliament could be obtained, than by the Post-office assuming the direction and management of an undertaking about which they cannot be expected to have a practical knowledge." Amongst the reasons given there is this, "That the buildings occupied by the post-offices in London and other towns"—not very many I apprehend—"are certainly not large enough to contain the apparatus and staff of the telegraph companies without considerable expense; and as the post-office is managed in a most economical manner, it follows that the post-office clerks have sufficient to occupy their time, without undertaking the work of telegraph clerks, for which they are entirely incompetent."

Now, my plan at least assumes that to all the most able of the permanent officers of the telegraph companies who chose to stay, the measure would simply operate to a change of masters—a change from private to public service, office, and position—a change to their advantage, whatever it might be to chairmen and directors. But does his plan of amalgamation assume the utilisation of the present ten thousand postal stations and their masters, and the seventy-two thousand miles of daily foot deliveries, or does it not? To assist his conception, I may mention that the aggregate extent of the daily foot deliveries in Ireland exceeds the diameter of the globe, and in the United Kingdom they are in the aggregate of an extent of nearly three times its circumference. If it does dispense with the services of the eight or nine fold establishments, what is the comparative worth of his plan? If it does not dispense with them, is it expected that the control of public establishments and of public offices would be given to private and comparatively irresponsible trading companies? He cannot but admit that there would be a considerable gain by the unity even of the existing telegraph companies competing establishments, apart

from the gain derivable from amalgamation with the postal establishments. "The saving of establishment charges by consolidation and amalgamation," he says, "would of course amount to a considerable sum annually, and had the company dared to hope that Parliament would have granted an act for the federation of their various undertakings, involving a fair and reasonable tariff to have been fixed by Parliament, they would have submitted a bill for that purpose years ago."

Nearly the like propositions have been entertained by railway directorates, and by the directorates of water companies and of gas companies. But having obtained privileges from Parliament on the basis of free competition, the public will say, and the Parliament must say, that they, the companies, must abide by that principle, and that it will not abrogate it in their interest by the creation of any great trading monopoly, seeking profits by exactions on the public necessities, and having comparatively nominal responsibility for their acts. Such a trading monopoly would offer the most serious impediments to the progress of improvement, from having strong interests against it. It would, moreover, perpetuate a vicious principle of administration, that of men having other and more powerful interests to attend to, namely, their own peculiar professional pursuits and interests, and giving only a divided and distracted attention to great subject matters, of a nature to tax the undivided attention of the most competent officers, stimulated by exclusive personal interest in their success. The practical objection I entertain to such plans as that of Mr. Bidder—of Government borrowing money at 3½ per cent. and lending it at 4½ per cent. to the companies, on the security of their lines, to pay off their debenture and floating debts, and constituting the one per cent. beyond the borrowing price into a sinking fund to redeem the roads in time—is, that these plans dispense with the great economies and the immense conveniencies of the saving of time and otherwise, derivable from unity of responsible management; they continue the vicious principle of management by the divided attention of practically irresponsible directorates. If the consideration even of a federative direction came to pass, and the continuance of the separate directorates, and the interests of individual directors were set aside, I expect that they would themselves provide for an executive direction under undivided attention and responsibility, and would leave to directorates only functions of inspection and audit, on the French principles of *conseils de surveillance*. But if the separate management by directorates be given up, and the need of public responsibility be duly considered, parties would, I apprehend, concede the need of a governmental authority being at once and directly charged with the work, subject to the control of Parliament.

To return to the assertions of the Chairman of the International Telegraph Company. The assertions of such practical authorities against the economy of telegraphic and railway reform are of the same sort as those of the old practical officers against postal reform. They declared that the penny post would be an utter ruin. In Switzerland and several parts of the Continent halfpenny posts pay. But the fact of a thing being done is, I must submit, cogent evidence of its possibility, and I beg to remind the association that it is being done widely. In Belgium telegraphy was commenced as in England, by trading companies, and they were proceeding in a poor way to themselves, and unsatisfactorily to the public (much on the miserable scale of the companies' telegraphs in Ireland), when they were bought up by the Government, and a system of postal telegraphy established on a uniform franc message principle. This, as I have stated, answered so well that a uniform half-franc message has been adopted, and in the course of a year the revenue has been replaced, and is now going on increasing. In London a small company was established on a plan of sixpenny messages, but the stations being comparatively few and many of the deliveries very slow—not quicker than many other means—it was a failure. In the district of Paris there was a postal system of uniform franc telegraphic messages, which has lately been reduced to half-a-franc. In less than a year there has been a tenfold augmentation, and the use of that telegraph is going on increasing.

In the United States, the recommendation of a committee of the Senate on the post-office and on post roads urging that the post-office department shall be authorised to undertake postal telegraphy as a work of necessity and public convenience, is still before the legislature. In Massachussetts I know, from my own correspondence, and I believe in others of the States, the questions we have raised here, as to the resumption of the public rights, and the reimposition of the Governmental duties in respect to railway communication, are being raised there.

The chief economical and administrative conclusions which I have now to submit, are:—That communication by railway forms part of a connected system, for the transit of persons, letters, information, and goods. That as a regulating, and predominant controlling function, constantly acting, to ensure punctuality in the departure and arrival of trains, as well as the postal deliveries connected with the trains, the postal function has properly a chief place. That the exercise of this controlling function, for ensuring punctuality in the conveyance of letters, is of importance for insuring punctuality in the conveyance of passengers, as well as of parcels conveyed by quick trains, That the postal stations and the services of the postal officers and servants should, for the public economy, be utilised for the conveyance of telegraphic messages as well as of small parcels, as in several continental states. That the police stations, and the naval and military stations, should be combined in a complete system of telegraphic communication. That, hence it follows, as a question of administrative improvement, that the exercise of the functions, for the conveyance of letters, telegraphic messages, passengers, and goods should be combined under one chief and responsible public authority.

Unity of management, under a public authority of railway communication, will be in itself an important advance in public improvement. Unity of management of telegraphic communication in connection with the post will also be in itself an important and much-needed improvement. But jarring action will be avoided—the improvement in the pecuniary and other results will be the more complete and speedy—if the requisite combination and subordination of administrative functions be considered and provided for at the outset.

Ireland has, in its general police, the elements of administrative improvement in advance of England. Ireland has, too, an administration of relief provided for the destitute in advance of that of England. I trust that, through its representatives, it will have, as it ought to have, the lead in the necessary improvement of all the means of internal communication.

If I may use a simile derived from sanitary science, I would say that, to give entire freedom to the main arteries of communication, to complete the capillaries of the system, the branch railways—to provide for it, as it were, a new set of nerves of quickened sensation and motion, by a cheap system of postal telegraphy, would, more than any other measures, put the body politic in a condition of healthy and prosperous action, such as has been imparted to Belgium by the like means. By those means unhealthy formations may be made to slough off, and morbid conditions, and febrile action, the result of deficient and interrupted circulation and stagnation, may be best dissipated.

Manufactures.

Albumenized Paper.—It appears, by the *Stationer*, that at Dresden albumenized paper is now being made in very large quantities, and is considered the best, by

reason of the excellent and regular manner in which it is produced. Although scarcely four years ago the trade was unknown here, the city is now manufacturing at the rate of upwards of 6,000 reams per annum, a quantity that would suffice to print more than 120,000,000 photographs of the size known as *carte de visite*. The albumen is extracted from the white of the new-laid eggs of fowls, and nearly 2,000,000 eggs are consumed, the yokes of which are used by tanners for preparing the finer kinds of leathers. After preparation, the paper is carefully assorted, and from ten to fifteen per cent. is thrown out, but is made available by the Dresden printers for colour-printing.

Commerce.

The Use of the Saccharometer.—The *Produce Markets Review* speaks of the important aid this instrument is for the analysis of sugars, as shown by a striking experiment carried out by M. Dubrunfaut, and recorded by him in a recent number of the *Journal des Fabricants de Sucre*. Two samples of West Indian sugar, No. 10, of the same shade of colour, and apparently of the same commercial value, after being submitted to the saccharometer, were ascertained to contain 93·00 and 88·00 parts of saccharine matter respectively; of which only 88·63 and 78·17 represented the extractable sugar. Now the values of these two sugars, according to the usual method of judging by types, would have been the same in each case, at the rate of 54 francs 50 centimes per 100 kilogrammes, but with the aid of the molassometer, the values were ascertained to be in the one case at the rate of 54 francs 69 centimes per 100 kilos., and in the other only 47 francs 25 centimes; so that an English sugar refiner buying by colour, acording to the Dutch system of types, would have paid in one case exactly 7·44 per 100 kilos. above its real value! Is not such an instance as this sufficient to convince the most sceptical how necessary it is for us to keep pace with the rapid advances made in the knowledge of this subject on the Continent? What with the disadvantages arising from the unfair operation of the Drawback Convention, and the unwillingness of the refining body to have recourse to even such resources as are in their reach, it is not to be wondered at that continental refiners undersell our countrymen in all the markets in Europe.

Trade and Revenue of 1866.—The Commissioners of Customs, in their report for the year 1866, say that "the statistics of trade and revenue for that year must be admitted to afford a remarkable example of the vitality and elasticity of the resources of this country." It appears that there has been an increase of twenty-three millions, or 13 per cent., in the values of the exports of British and Irish produce for the year 1866 over those of 1865, which was a year of great national prosperity; that there has been an increase of twenty-four millions in the total imports into the country for 1866 over the year 1865, and a considerable rise in the general consumption of nearly every article subject to duty; and, notwithstanding the extensive reductions that have been made of late years in duties, there is still an increase in the gross customs receipts over those of 1865. This is the more remarkable, considering the disastrous events that occurred in that year: war on a gigantic scale on the continent of Europe, and a seditious outbreak of a very serious nature in the neighbouring country of Ireland; a deficient harvest throughout the United Kingdom, and a monetary and commercial crisis of almost unparalleled severity; besides the cattle plague and the cholera. Notwithstanding these disasters, the report declares that no year since the commencement of the publication of these reports, except 1865, can show so favourable a return.

Swedish Filtering Paper.—The filtering-paper made in Sweden (says the *Stationer*) is probably better than that produced by any other nation, in consequence of its being wholly free of accidental salts, which in many papers of similar make often entirely destroy the effects of chemical analysis. The excellence is supposed to be due to its being made entirely of linen rags, more readily procured here than elsewhere, and to the purity of the water. This hint may be serviceable to foreign makers of filtering papers, by causing them to use in its manufacture only distilled water. A recent experiment proved that an equal weight of linen and Swedish filtering-paper being burned, each gave forth the same volume of cinder. At the present time large orders of common writing-papers are being executed at Rosendahl for exportation to England, though possibly it is not known that these qualities contain sixty per cent. of wood-pulp. In spite of this circumstance, however, they meet with a ready sale.

Colonies.

Cape of Good Hope.—Large prizes have been offered by the government for tobacco of certain quality fit for exportation to European markets, and this has greatly stimulated its cultivation. Silk culture has likewise been taken in hand, the legislature this season giving the executive authority to lay out mulberry plantations in different parts of the colony for the purpose of encouraging the culture of silk for exportation. The extension of chicory fields is also encouraged that the pure article may be produced, instead of having one that is adulterated imported. A good deal of attention has been directed to improvements in tanning, and experiments have been made with the many acrid barks this colony abundantly places at the tanner's disposal to ascertain the best for various purposes.

Land in South Australia.—During the year ended 31st March, 1867, 214,431 acres of land were sold by the South Australian government, more than 100,000 acres less than the quantity sold during the same period of the preceding year. The total area of purchased land in the occupation of lease and free holders on 31st December, 1866, was 3,424,721 acres, or 20 acres per head of the estimated population. It appears that the most numerous class of farmers are those with between 100 and 200 acres. With regard to cultivation, the increase of last year was rather better than that of the year before. The total quantity of ploughed land was 739,714 acres, as compared with 660,569 acres in 1865-6.

The Province of Otago.—A New Zealand paper says that the abundant harvest of last year has pressed upon the attention of the inhabitants of this province the necessity for improved communication between the interior and ports of shipment. Prices of agricultural produce have ruled exceedingly low, and the heavy cost of carriage interferes to a great extent with the prospect of exporting the surplus with a profit, where the grain has to be carried any great distance. A railway would obviate this difficulty considerably, and tend to bring into cultivation a still larger area than at present, if, by cheapening cost of transit, produce could be grown and exported at a profit. It would be still better if, by a steady stream of immigration, consumers who were likewise producers could be introduced into the province.

Gold from Victoria.—From the commencement of the gold diggings in Victoria, in 1851, to the end of 1865, 309,980,71 ozs. of gold have been obtained, of the value of £123,992,284. It is estimated that out of 86,831 square miles, the area of this colony, one-third is occupied by gold-bearing rocks. Out of more than 18,000,000 of acres available for research, less than half a million have been in any way explored. At the end of 1865 not more than 135,000 acres were actually occupied for mining purposes. The value of machinery on the gold-fields is estimated at nearly £2,000,000, giving an average of £23 for every man employed, and of £14 for every acre occupied. The total value of the claims is

estimated at nearly £8,000,000. To increase the yield of gold, the principal thing required is a steady supply of water. Private water-races have been constructed in some districts. In the whole colony there are now nearly 2,000 miles of water-races, the construction of which has cost more than £250,000; but great works are being carried out by Government, which will eclipse all private works. This water supply, which is expected in itself to prove a remunerative undertaking, will stimulate mining industry, and make the yield of gold more uniform all the year round.

New Zealand Coal.—A valuable discovery of coal has been made in Preservation Inlet, at the south-western extremity of the province of Otago. A vessel which left the latter port some time since on a prospecting expedition, has returned, bringing a quantity of coal obtained from Preservation Inlet. The samples are said to be of good quality, and the best yet produced in this province.

Notes.

Italian Workmen at the Paris Exhibition.—A commission of artists and workmen has just been sent by the town of Trent, under the guidance of Professor Rosetti and a young architect, Signor Taminini. The twenty-one districts of Trent, situated in picturesque and fertile valleys, alone form an important agricultural and industrial country. Silk and wine form the principal elements of wealth in this district; the olive and tobacco are sufficient to supply an important trade. The forests are numerous in these valleys, and timber of every quality grows with the same rapidity as in Norway. The mineral resources are most extensive, and only require to be worked, and the provinces of Trent will become the Switzerland of Italy—the vineyard of Bavaria and the Tyrol. The Vinicultural Society of Trent, founded three years ago by the late M. Boscarelli, is most prosperous, and the wine produced by it rivals in quality those of Italy and the Rhine. Numerous silk-spinning mills, tanneries, paper-mills, manufactories of silk stuffs and velvets, iron and copper-works, of which several are honourably represented at the Paris Exhibition, are scattered about in this country, but in a small relative proportion, considering its production of combustibles, water-power, and industrious population of 400,000 inhabitants.

Foot-bridges across Thronged Streets.—The authorities of Paris have accepted a tender for the construction of an experimental iron bridge for foot passengers, for the junction of four streets. The experiment of relieving crowded streets by such means is to be tried, at first, at the spot where the Rue de Madrid and Rue Rochet cross each other.

Patents.

From Commissioners of Patents' Journal, October 11th.

Grants of Provisional Protection.

Alarm apparatus—2651—E. H. Newby.
Axles, &c., cranked—2693—R. Wilson and J. Nuttall.
Boots and shoes—2683—A. M. Clark.
Buildings, warming and ventilating—2701—W. Woodcock.
Carriage steps—2671—T. Kendrick.
Cartridges—2654—C. E. and J. Green.
Cheques, bills of exchange, &c.—2719—J. Jameson.
Cinder sifters—2709—J. A. Smyth.
Cisterns—2665—A. Mackenzie and S. Robinson.
Cores used in casting metallic pipes—2691—J. Antill, G. Grimes, and H. C. Tunks.
Envelopes—2647—C. McDermott.
Envelopes—2675—J. Griffin and F. Green.
Envelopes—2681—R. Wappenstein and A. Laidlaw.
Epsom salts—2685—A. Ziegele.
Fabrics, printing—2581—J. B. Meldrum.
Fabrics, printing—2597—W. Whitehead.
Fire-arms, breech-loading—2587—J. R. Cooper.
Fire bars—2689—J. Lewis, W. Huntington, and W. Anyon.
Fire guards and screens—2589—H. Symons.
Food, combining animal with vegetable—2661—D. T. Lee.
Fuel, artificial—2577—H. R. Lückes.
Fuel, perfect combustion in the burning of—1610—T. Petitjean.
Furnaces—2611—C. Holste.
Furnaces—2679—W. Beardmore, W. Brock, and A. C. Kirk.
Furnaces, &c.—2571—W. Baker.
Gas burners—2692—T. H. Williams.
Gas, distributing for heating and lighting—2629—R. Watson.
Grain, &c., crushing—2627—T. B. Wilkinson.
Grain, &c., drying—2071—J. L. Norton.
Hat ventilators—2655—P. Crause.
Heavy bodies, lifting, &c.—2663—J. Meiklejon.
Horse rakes—2583—J. Wilderspin.
Horse rakes, &c.—2639—J. H. Sams.
Hydro-extractors, &c.—2569—E. K. Dutton and S. Mason.
Iron—2637—J. G. Willans.
Iron, glazed surface on cast—2717—E. T. and C. Horsley.
Lace—2613—W. Brailsford and J. Gadsby.
Liquids, heating, &c.—2593—W. F. Batho.
Locomotive wheels—2591—J. Reid.
Maps, &c., holders for—2615—T. Turner.
Metal bars, &c., rolling—2635—W. Molineaux.
Mining and tunnelling apparatus—2607—J. A. McKean.
Motive-power—2633—W. J. Murphy.
Moulders' blackening—2711—R. W. Bennie.
Paraffin—2721—J. Fordred.
Pens—2669—J. Rives.
Petticoats—2649—R. Raffault.
Potatoes, digging—2697—W. M. Cranston.
Printers' rollers and blankets, washing—2667—T. Muir.
Projectiles—2695—J. C. Bayley and D. Campbell.
Railways, communication between passengers and guards on—2617—S. C. Amesbury.
Refrigerators—2707—J. Oxley.
Salt—2575—J. Davies.
Saws—2579—W. E. Newton.
Sewing machines—2609—G. F. Bradbury and T. Chadwick.
Ships, propelling—2605—P. Crause.
Soap—2608—P. Dumont.
Sofas, spring mattresses, &c.—2619—D. Gardner.
Sponges—2646—C. McDermott.
Steam engines—2713—J., B., and R. Wood.
Taps—2703—A. Rooker.
Telegraphs—2599—W. G. Brownson.
Tobacco pipes—2585—J. W. Halfpenny.
Tobacco pipes—2673—G. W. McGeorge.
Valves—2625—T. Adams and G. J. Parson.
Ventilators—2641—W. Potts.
Water, preserving life in—2397—J. Goucher.
Whips and whip holders—2653—W. E. Newton.
Wine glasses, &c.—2595—J. M. Napier.

Invention with Complete Specification Filed.

Bolts, manufacturing—2808—W. R. Lake.

Patents Sealed.

950. S. Lilley.
1000. G. E. Derburgh.
1089. H. P. Boyd.
1090. J. W. Wallis.
1092. R. L. Hattersley & J. Smith.
1102. J. Shore.
1105. W. Gregory.
1113. R. Alexander.
1114. S. Harrison.
1115. W. Clark.
1116. W. Clark.
1117. J. W. Cochrane.
1123. G. Simpson.
1124. D. Rankin.
1130. R. Boby.
1134. R. Boby.
1190. J. H. Johnson.
1219. J. M. and C. Moseley.
1245. G. Davies.
1250. G. Davies.
1441. G. Coles, J. A. Jaques, and J. A. Fanshawe.
1442. G. Coles, J. A. Jaques, and J. A. Fanshawe.
1491. A. M. Clark.
1540. L. Stuckenschmidt.
1971. J. MacNaughton.

From Commissioners of Patents' Journal, October 15th.

Patents Sealed.

1121. J. E. Hodgkin.
1125. E. B. and J. P. Nunn.
1126. J. Lewthwaite.
1139. J. Scott.
1140. W. and J. Holding.
1142. W. Begg.
1143. E. Lindner.
1146. W. Wilkinson.
1157. E. Howell and T. Hardy.
1177. W. R. Lake.
1178. W. R. Lake.
1179. W. R. Lake.
1187. T. Tivey.
1234. G. Davies.
1248. R. W. Ridley & J. Withers.
1252. G. Hodgson.
1279. C. D. Abel.
1343. R. Smith.
1345. W. E. Newton.
1712. J. Graham.
1881. J. R. Cooper.
1955. T. Vicars, sen., T. Vicars, jun., and J. Smith.
2243. J. Smith.
2407. D. Howard.
2420. W. R. Lake.

Patents on which the Stamp Duty of £50 has been Paid.

2714. E. L. S. Benzon.
2494. E. H. Huch and F. Windhausen.
2495. T. Lambert & H. C. Soper.
2497. J. L. Vaughan.
2504. H. Tucker.
2527. M. Henry.
2615. R. Hornsby.
2515. J. Slater.
2539. J. H. Dallmeyer.
2590. W. Snell.
2603. J. E. A. Gwynne.

Patents on which the Stamp Duty of £100 has been Paid.

2574. J. and J. Wadsworth.
2468. R. Hornsby, jun.
2462. C. Wheatstone.
2510. A. McDougall.
2491. M. Strang.
2501. J. Higgins and T. S. Whitworth.

Journal of the Society of Arts.

FRIDAY, OCTOBER 25, 1867.

Proceedings of Institutions.

Avenham (Preston) Institution for the Diffusion of Knowledge.—The thirty-ninth annual report, presented on the 1st inst., records that the year has been, on the whole, one of satisfactory progress for the Institution. The number of members has undergone an increase of more than ten per cent. In the income from subscriptions the increase is still more considerable, being fifteen per cent. The constantly growing requirements of readers in the library, reading room, and news room, have been liberally met. In the evening classes some extension has been made in the range of instruction afforded, the attendance of pupils has been larger than in previous years, and the results of the several examinations held during the year have been most encouraging. The chess and conversation room, opened in the early part of the year, promises to be very popular. The number of members on the register is 507; the number last year was 456. The library now contains 8,116 vols., of which 276 have been added during the year. Classes in the following subjects were in operation during the class session:—Fine art, freehand, model, machine and mechanical drawing, geometry, and perspective (School of Art); inorganic chemistry, animal physiology, geology, and the principles of mechanics' (science classes); mathematics, English history, the French language, phonography, and the usual elementary subjects. The number on the class register is 312. Examinations have been held by the Society of Arts, by the Science and Art Department, by the Union of Lancashire and Cheshire Institutes, and by the council of the Institution. The School of Art has now been in existence seven years, and has, subject to occasional fluctuations, continued to make progress. With reference to the science classes, although the number of students on the register during the session was large, and the attendance was good, only seven candidates presented themselves at the examination, in May last. The Examinations of the Society of Arts, and the local examinations held by the council of this Institution, have been adopted this year for the first time. The results of the Examination of the Society of Arts are very satisfactory. The local examinations are instituted by the council with the view of affording the stimulus of recognition and reward to the efforts of class students whose cases might appear not to be sufficiently met by the provisions of the other examinations. A special feature of the local examinations was formed by the "English Composition Prizes" offered by the President of the Institution. These prizes were offered for English essays, the subjects being—For males:—1, "The Influence of Education on Life, Character, and Manners;" 2, "On Economy in the Expenditure of Money;" 3, "On the Choice of Books, and the Art of Reading Them;" 4, "On the Qualities which Conduce to Success in Life;" 5, "On the Advantage and the Means of Public Recreation;" 6, "A Description of the Avenham Parks." For females:—1, "On the Advantages of Education;" 2, "On Home Comfort;" 3, "On Household Economy;" 4, "On Good Manners and Obliging Behaviour;" 5, "On Dress;" 6, "On the Means of Recreation Consistent with the Discharge of the Duties of Domestic Life." For the prizes offered to males not more than three competitors appeared; for the prizes offered to females there appeared no competitors. The treasurer's accounts show that the current expenditure has been met by the income, which was £546 11s. 10d. The penny bank account shows a balance of £35 14s., representing deposits still remaining unclaimed. While, in conclusion, the Council refer with satisfaction to the steady progress of the Institution, indicated in the present report, and while they fully recognise the value of the results already accomplished by the Institution, the Council cannot but feel how inadequate are these results when viewed with reference to the number and educational needs of the class to which the Institution more particularly addresses itself,—the artizan class. So far as the agency of this Institution is concerned, these educational needs must remain inadequately provided for, until the pecuniary resources of the Institution are considerably augmented. A large addition to the machinery of the evening classes is urgently called for, and this, with the limited pecuniary means and building accommodation at their command, the Council are not in a position to afford. Class instruction is now everywhere recognised as the chief agency by means of which the objects contemplated by the promoters of Mechanics' Institutions are to be accomplished. In large towns like Preston, however, the full benefits to be derived from this agency will never be obtained so long as the instruction given is confined to one central Institution. Some well devised scheme of district evening classes is, therefore, greatly to be desired. It is believed that no insurmountable difficulty would be found to the establishment of such classes, while their value in diffusing the benefits of education amongst the working population will be apparent to all.

Chorley Mechanics' Institution.—The report for the year ending August 20th, 1867 (being the eleventh), states that the institution is now out of debt, with a balance of £7 5s. 4d., the year's receipts having been £105 2s. 8d. The number of members for the past year has been, honorary 34, news room 88, and ordinary 79, and the average attendance at the evening classes has been 35. The third examination of these classes, in connection with the Lancashire and Cheshire Union of Institutes, was held in February last, when out of the ten candidates examined, nine obtained certificates. The news room has been supplied during the past year with several new periodicals, and has been attended by a large number of readers. The library and smoking room also continue to be extensively patronised. There have been five penny readings and one concert during the season, which have realised a profit of £3 8s. 11d.

CARBOLIC OR PHENIC ACID AND ITS PROPERTIES.

The following lecture was delivered in French, a few months since, by Dr. Crace Calvert, F.R.S., &c., before the Society for the Encouragement of National Industry in France:—

Gentlemen,—I have readily accepted the friendly invitation of your illustrious president, Mr. Dumas, to submit to your notice some facts relative to carbolic acid. But before doing so, allow me to express publicly the feelings of gratitude which I owe to France for having opened to me the way to the profession which I pursue with such pleasure. In truth, it is to the sympathy of scientific men of this country, to the friendly assistance of one of your scientific celebrities, M. Chevreul, and to the liberality of your institutions, that I owe the knowledge I have acquired, the elements of which I gained at the Gobelins and at the Museum of Natural History during the stay I made there. After these remarks I will proceed with the subject of my lecture.

No doubt most persons present are aware that when coals are submitted to the action of a dull red heat, in a retort, products are obtained which may be grouped into four classes.

1st. Gaseous products, commonly called coal gas, and which are now employed in so general a manner as means of illumination, sources of heat and motive power.

2nd. Water containing ammonia and ammoniacal salts, substances which chemistry purifies, modifies, and which are then utilised in agriculture, manufactures, and medicine.

3rd. There distils with the above products a black, sticky substance, of an unpleasant odour, called tar.

4th. There remains in the retort a solid, porous body, which is known to us all as coke.

When the above-mentioned product called tar is submitted to distillation, water first comes over, then there distil jointly with this fluid, liquid carburretted hydrogens, which being lighter, float on it, and are therefore called light oils of tar: and, lastly, compounds heavier than water are collected, which bear the name of heavy oils.

It is these heavy oils which were the first tar products utilised in manufacture. Their consumption made such rapid progress in England, that special manufactories were established for their preparation, and these works were, for a long period, the only ones in which tar products were produced. Most of them were established towards 1837, for the production chiefly of coal naptha, used for many purposes, and heavy oils, employed for the preservation of railway sleepers, by a process discovered by Mr. John Bethell, by means of which they are preserved twelve, fifteen, or even twenty years; whilst without it they decay after three or four years. I have much pleasure in calling your attention to a very remarkable and very complete work upon the creosoting of wood, by M. Forestier, chief engineer of the department of La Vendée, assisted by M. Marin, an engineer. These gentlemen have made, as you can see, numerous experiments, the result of which is that wood thus treated is preserved from decay in water as well as under ground, and, what is very important, it is no longer destroyed by that very destructive insect the *teredo*.

Lastly, there remains in the still (after the heavy oils and semi-solid substances have distilled off) a product, which is fluid at the high temperature at which this operation is conducted, but which, when exposed to the natural temperature of the atmosphere, becomes hard and brittle, and is known under the name of pitch, and which is so largely employed in Paris under the name of asphalte, bitumen, &c., to form the foot pavements and public walks, as well as for the manufacture of a sort of concrete, called in England patent fuel.

I now come to carbolic acid.

It is twenty years since Laurent, the eminent chemist, first pointed out the easy method of extracting carbolic acid from coal tar. It consisted in submitting the light oils to a fractional distillation, and then treating with a concentrated solution of potash those products which distilled at a temperature between 160 and 200 degrees, separating the alkaline solution from the hydrocarbons which floated on it, and then neutralising by an acid which liberated the carbolic acid.

Such was Laurent's method of preparing carbolic or phenic acid, but pure carbolic acid was only there in a very small proportion; it was, in fact, a mixture composed chiefly of different liquids similar in properties and composition to carbolic acid, and though Laurent succeeded in obtaining pure carbolic acid, still the process devised by him was too expensive to answer as a commercial production; and besides, his method of operating was too complicated.

In 1847, Mansfield, and towards 1856, M. Bobœuf, made known processes which, in fact, were only a modification of Laurent's, for they consisted principally in employing caustic soda instead of potash, and in treating the whole of the light oils instead of a special portion, as Laurent had done; but by these processes a very impure acid was still obtained, from which it was very difficult, as experience has shown us, to extract pure carbolic acid; however, in a commercial point of view, the process of these gentlemen was a step in advance. I may add that it was this impure carbolic acid which Mr. John Bethell manufactured, at my request, about the year 1847; and it was this impure acid which was also employed by several chemists who, like myself, studied the properties of this substance, and who endeavoured to apply it usefully, either in the production of picric acid, or in preventing the transformation of tannic acid into gallic acid, in tanning substances, or, finally, in the preservation of subjects for the dissecting-room. M. Bobœuf also made use of it in preserving organic bodies from putrefaction, a property which has received of late very important applications.

In 1859, M. Marnas, of the firm of Guinon, Marnas, and Bonnet, of Lyons, came to Manchester, and asked me to furnish him with a purer carbolic acid than had been as yet manufactured. He showed me a white and crystalline product, which he gave as a specimen. It was then necessary to make new experiments, and I discovered that the best mode of preparation was not by treating light or heavy oils of tar with concentrated alkalies, but, on the contrary, treating the impure benzines of commerce or napthas with weak alkaline solutions. By this means a semi-fluid, blackish product was obtained, a little heavier than water, of a density of 1·06, and which contained 50 per cent. of real carbolic acid, which acid I managed to separate in part by careful distillation. It is this product which was employed by Messrs. Guinon, Marnas, and Bonnet, and others, till 1861, for the manufacture of colours derived from carbolic acid. At this period the colours obtained from aniline were so fine and brilliant that, to keep up a comparison with them, it was necessary to improve those derived from carbolic acid. To effect this it was necessary to improve the quality of the carbolic acid then manufactured, and, after some trials, we (F. C. Calvert and Co.) produced carbolic acid in white detached crystals, melting at between 26 and 27 degrees, and I may here add that this is the product which is now generally employed in commerce and industry, for there are numerous examples of it at the present Universal Exhibition. In 1863 this relative purity was not sufficient. The same firm which had requested the improvements which I have before named asked us to try and make it still purer. We again set to work, and produced commercially Laurent's carbolic acid; that is to say, a substance melting at 34 degrees centigrade, and boiling exactly at 186 degrees. This became a very important commercial product for us, and we delivered large quantities monthly.

From this time I made many efforts to draw the attention of medical men to the really remarkable therapeutic properties of carbolic acid, but the tarry and sulphurous smell which it still possessed was a serious obstacle to its application. I soon succeeded in overcoming this difficulty, and towards the end of the year 1864 our firm was in a position to deliver in considerable quantities carbolic acid deprived of sulphurous compounds, and therefore fit for all medicinal uses. But I am glad to say that the series of improvements in the manufacture of pure carbolic acid did not stop there, for towards the end of last year I discovered a process which now enables me to show you a product completely deprived of all disagreeable odour and tarry flavour, and, in fact, as pure, though extracted from tar, as if it had been produced artificially by the help of the reactions recently discovered by Messrs. Wurtz and Kékulé, based upon the direct transformation of benzine into carbolic acid, or by the well-known changes by which it may be obtained from salicylic acid or nitro benzoic. This carbolic acid is distinguished from Laurent's in being soluble in 20 parts of water, whereas the latter requires 33. It is fusible at 41, instead of 34, and boils at 182 degrees, instead of 186, but it gives, like Laurent's, the blue colour described by M. Berthelot when mixed with ammonia, and to the solution is added a small quantity of a hypochlorite; the same effect is also produced when you expose to the vapours of hydrochloric acid a chip of deal soaked in this pure carbolic acid.

It was supposed that, as Laurent's acid had a constant boiling and crystallisation point, it was a pure and definite

substance. Now, the production of our new acid shows it is nothing of the kind, the product of Laurent being only a mixture of our pure carbolic acid and a liquid homologue; for when to the acid of Laurent is added a certain proportion of water, and the mixture is exposed to a temperature of four degrees centigrade, it deposits a crystalline substance in large octahedrons; this substance is a hydrate of carbolic or phenic alcohol, that is to say, carbolic acid combined with an equivalent of water of crystallisation. This fact is important in a chemico-theoretical point of view, for it exhibits the only example known of an alcohol which, combining with water, forms a crystallised and solid hydrate. By removing from this hydrate the equivalent of water which it contains, carbolic acid is obtained in its purest state.

We will now rapidly glance at the applications which have been made of this product for sanitary purposes, in medicine, agriculture, and manufactures.

The disinfectant or rather antiseptic properties of carbolic acid are very remarkable. The beautiful researches and discoveries of M. Pasteur have shown that all fermentation and putrefaction is due to the presence of microscopical vegetables or animals, which, during their vitality, decompose or change the organic substances, so as to produce the effects which we witness, and carbolic acid exercises a most powerful destructive action upon these miscroscopic and primitive sources of life. Carbolic acid, therefore, is an antiseptic and disinfectant much more active and much more rational than those generally in use.

And allow me further to add that disinfectants, such as chlorine, permanganate of potash, or Condy-fluid, operate by oxidising not only the gaseous products given off by putrefaction, but all organic matters with which they may come in contact; whilst carbolic acid, on the contrary, merely destroys the causes of putrefaction, without acting on the organic substances. The great difference which therefore distinguishes them, is, that the former deals with the effects, the latter with the causes. Again, these small microscopic beings, these ferments, are always in small quantities as compared to the substances on which they act, consequently a very small quantity of carbolic acid is necessary to prevent the decomposition of substances; therefore, its employment is both efficacious and economical. Moreover, carbolic acid is volatile; it meets with and destroys, as Dr. Jules Lemaire says, the germs or sporules which float in the atmosphere, and vitiate it, and this cannot be the case with Condy's fluid, chloride of zinc or iron, which act only by contact, and are mere deodorizers. This is why carbolic acid was used with such marked success, and therefore so largely, in England, Belgium, and Holland during the prevalence of cholera and of the cattle plague. The antiseptic properties of carbolic acid are so powerful that $\frac{1}{1000}$, even $\frac{1}{5000}$ will prevent the decomposition, fermentation, or putrefaction for months of urine, blood, glue solution, flour, paste, fœces, &c., &c.; in fact, its vapour alone is sufficient to preserve meat in confined spaces for weeks; a little vapour of this useful substance will preserve meat for several days in the ordinary atmosphere, and prevent it being fly-blown; lastly, $\frac{1}{10000}$ has been found sufficient to keep sewage sweet; and I am proud to say that the British Government have decided to use exclusively our carbolic acid (as a disinfectant), not only on board her Majesty's Navy, but in other Government departments. Although questions of public health are the province of medicine, still permit me to say a few words on the medicinal properties of carbolic acid. This question deserves to be treated thoroughly, for carbolic acid is susceptible of so many applications in this direction; its properties are so marked, so evident, and so remarkable, that they cannot be too much published, and it is rendering a service to mankind to make known the employment of so valuable a therapeutic agent.

I wish all who are listening to me were medical men, for I could show, by numerous and undeniable facts, the advantage they might derive from carbolic acid, and if my testimony was not sufficient to convince you, I would invoke the authority of men justly esteemed amongst you. I would recal to you the words of the good and learned Gratiolet and those of Dr. Lemaire, showing that carbolic acid is the most powerful acknowledged means of contending with contagious and pestilential diseases, such as cholera, typhus fever, small pox, &c. Maladies of this order are very numerous, but in carbolic acid we find one of the most powerful agents for their prevention. Besides its antiseptic action, the caustic properties of carbolic acid are found useful; most beneficial effects are obtained from it in the treatment of very dangerous and sometimes mortal complaints, such as carbuncle, quinsy, diptheria, &c., as shown by Dr. Turner, of Manchester, and also in less severe affections, such as hœmorrhoids, internal and external fistulas, and other similar complaints. But what must be especially mentioned is the employment of carbolic acid in preserving in a healthy state certain purulent sores, and preventing the repulsive smell which comes from them, a smell which is the symptom of a change in the tissues of the flesh, and which often presents the greatest danger to the patient. The services which carbolic acid renders to surgery can be judged of by reading several most interesting papers lately published in the *Lancet* by Mr. Lister, F.R.S., on compound fractures, ulcers, &c., &c., and by visiting the two sick wards of Dr. Maisonneuve, at the Hotel Dieu. Further, I must not overlook the valuable application made of it to gangrene in hospitals by the eminent Mr. Paget. Lastly, it has been used by many of the most eminent medical men with marked success in those scourges of humanity, phthisis and syphilis.

In agriculture our firm has stimulated the employment of the carbolic acid for the cure of certain diseases very common to sheep—scab, for example. The method of treatment customary in similar cases was very imperfect as well as dangerous, whilst with carbolic acid this malady is cured, and without danger to the animal, by dipping it for a minute, often only for some seconds, in water containing a small quantity of carbolic acid. For this purpose pure acid would be too expensive, and is not used, nor concentrated acid, which ignorant men who have the care of sheep would not know how to use, but by the help of soap an emulsion is made. After having shorn the sheep it is dipped in this mixture; a single immersion in a bath containing $\frac{1}{60}$ of it is sufficient to effect a cure. After scab, the foot-rot is one of the worst and most frequent complaints. Carbolic acid is also for that an efficacious remedy. For this a mixture is made of the acid and an adherent and greasy substance, capable of forming a plaster, which can be made to adhere to the animal's foot for two or three days, preventing the contact of the air, allowing time for the application to produce its effect. But if the flock be numerous, it would take a long time to dress the four feet of each animal one after another; so, to make it more easy, a shallow tray is made of stone, a sort of trough; this is filled with the medicated mixture, and the sheep are made to pass through it; their feet are thus impregnated with the required substance. Permit me also to state that cattle cease to be annoyed with flies, &c., if washed with this solution, or a weak solution of carbolic acid.

Manufacturers have not yet availed themselves one tithe of the valuable properties of carbolic acid, and in this direction a new field is open to its use; still I may cite a few instances. The preservation of wood has been already referred to, and, thanks to its use, the great trade in skins and bones from Australia, Monte Video, Buenos Ayres, &c., is benefited. Wild animals living there in herds are slaughtered by thousands. Formerly they came to us in a bad state, half putrid, emitting an insupportable odour, and only fit for manure; in this state their price was not more than 150 francs the 1,000 kilogrammes, now, thanks to carbolic acid treatment, they arrive perfectly preserved; they can be employed for all the uses to which green or raw bones are usually applied, and the value of

bones is raised as much as from 250 to 300 francs. Hides also arrive putrid, unless they have been dried rapidly in the sun or salted, which necessitated a long and costly operation; whilst it is only necessary to immerse them for twenty-four hours in a solution of two per cent. of carbolic acid, and dry them in the air, to secure their preservation. It is probable that in a short time the blood, intestines, and other parts of these animals will be, by means of carbolic acid, converted into manure, and imported into this country. In England carbolic acid is used in the preservation of guts at the gut works, for keeping anatomical subjects, and the preservation of all animal matter. Carbolic acid is also utilised in preventing the decomposition of the preparations of gelatine and albumen, used in spinning, dyeing, and calico printing.

One of the most interesting chapters in the history of carbolic acid is certainly that which treats of the production of colouring materials; they alone enter into comparison with those derived from aniline, and often enter into successful rivalry with them. Amongst the colouring matters derived from carbolic acid, the most important is, without fear of contradiction, picric acid. The discovery of this acid dates back to a distant period; it was studied by Welter, and was called Welter's bitter.

My illustrious master, M. Chevreul, resumed in 1807 the study of the action of nitric acid on organic matters, and showed, in an admirable paper, that picric acid was often produced when organic matters were acted upon by nitric acid. M. Chevreul discovered in the products of the oxidation of organic substances through nitric acid two different bodies, which he called *amer au minima* and *amer au maxima*, the latter being picric acid. This acid was again examined by Laurent in 1841. This profound chemist showed that the true generator of picric acid was carbolic acid; that in the action of nitric acid on the latter it formed three nitrogenated compounds, mononitrophenic acid, binitrophenic acid, trinitrophenic acid, the latter being also picric acid.

These interesting results of Laurent would perhaps have remained for a long time without any commercial value if picric acid had not been applied to dyeing, in 1847, by M. Guinon, senior, of Lyons. Since then the use of this acid has been much extended, not only in producing magnificent yellows, but also, joined with indigo, in the production of ordinary greens, or of *vert Lamière* with Prussian blue, so that its consumption may be valued at from 80 to 100,000 kilogrammes annually; our firm alone produces more than 300 kilogrammes weekly; and when it is considered that 1 kilogramme of picric acid dyes to an intense shade 70 to 100 kilogrammes of silk, or 40 to 50 kilogrammes of wool, the enormous quantity of textile materials dyed by this single product may be appreciated.

The processes used for the preparation of picric acid are still those which Laurent indicated in 1841; but instead of using carbolic acid, loaded with the heavy oils of tar, as M. Guinon had done, I sought to diminish the quantity of nitric acid, employed in mere waste, on the heavy oils of tar, which were then mixed with carbolic acid, and I am glad to say that since 1852 I have used, in the manufacture of picric acid, carbolic acid containing only some of its liquid homologues. In 1856, M. Boboeuf took out a patent in France for making picric with carbolic acid. But picric acid was then at a high price, and it is only since our firm has obtained carbolic acid cheap that picric acid can be produced freed of all those resinous materials which prevent its purification and low price; in fact, owing to our pure carbolic acid, picric acid is now manufactured chemically pure; this product, which was sold some years since at 30 to 40 francs the kilogramme, is now sold at the rate of 10 francs. Further, I may add that to apply it in a quick and economical manner it is desirable to add to the dye bath a small proportion of sulphuric acid; this method of manipulation, which is not generally known, is very important, for it is only in this way that the textile materials can be readily dyed, and the baths exhausted.

I shall now have the pleasure of calling your attention to the production of two new colouring substances derived from picric acid:—

1st. Picramic acid was, in the first instance, obtained by Wölher; by making sulphate of iron act upon picric acid, and neutralising with caustic barytes, a deep brown salt was thus produced, from which he separated the barytes by the help of sulphuric acid, and by these reactions M. Wöhler obtained an acid to which he gave the name of nitro-hematic acid; but it is to M. Aimé Girard that we owe the practical process by means of which we are able to manufacture great quantities of picramic acid. This acid imparts to silk a beautiful series of brown tints, similar to those obtained from catechu.

2nd. Isopurpurate of ammonia. It is with much pleasure that I noticed, at the exhibition, in M. Casthelaz's case, a coloured material, known in the trade by the name of soluble garnet, which, I am informed, is used especially by M. Chalamel, of Puteaux; this substance is particularly remarkable, as it is isomeric with the *purpurate of ammonia or murexide*. Although the preparation of this colouring material was first pointed out by M. Carey, still it is really due to a previous discovery, by Hlasiwitz, who called attention to the reaction of cyanide of potassium upon picric acid, and to which chemical reaction we owe the knowledge of manufacturing the isopurpurate for industrial purposes.

Before taking leave of picric acid it may not be without interest that I should state a curious application which has been made of the explosive property of its salts. During these last few years the picrate of potassium has been employed in great quantities, by Mr. J. Whitworth, for charging the bombs for destroying the iron plating of ships. When the projectiles thus prepared strike the iron masses, the enormous propelling force with which they are expelled from the gun is instantaneously converted into heat, and to such an extent that the ball becomes red hot, the heat decomposes the picrate of potash, and a violent explosion ensues, owing to the enormous quantities of vapours and gases which are generated in an instant of time. Whilst the alkaline picrates are endowed with such formidable properties, they also possess properties which are useful for the alleviation of human misery. Picric acid is an efficacious remedy in intermittent fevers. Persons affected with such types of fever, upon whom quinine has lost all its beneficial effects by continuous usage of it—and this is the case with some of our soldiers who return from India—derive, I am glad to say, wonderful benefit from the use of picric acid and picrates, as Dr. Aspland has proved to be the case, at the military hospital at Dukinfield. The knowledge of this fact may be useful in districts in which exist poor populations, for it affords them a cheap febrifuge; and, moreover, picric acid is not dangerous, as arsenical preparations are, nor does it derange the stomach like quinine.

To return to the colours derived from carbolic acid, allow me to remind you that when, in 1834, Runge discovered that acid amongst the products of coal tar, he observed at the same time the existence of two colouring substances, to which he gave the name of rosolic acid and brunolic acid.

I will not detail here the processes by which Runge extracted these substances from the residue of coal tar by means of lime, nor the method adopted by Messrs. Smith, Dussart, and Jourdin for producing these substances by direct oxidation of phenic or carbolic acid, but will describe rapidly the process which we now use to manufacture rosolic acid, and which should not be attributed, as is generally believed, to M. Kolbe, as it is due to M. Jules Persoz, the son of the celebrated Professor of tinctorial chemistry in the Conservatoire des Arts-et-Metiers. His process consists in making oxalic

acid act upon sulphophenic acid at a temperature of about 160 degrees, and the product which results from it has the bronze green appearance of cantharides. To render it suitable for employment in dyeing it is only necessary to wash it so as to separate from it all the sulphuric acid with which it is contaminated. It is then known under the name of yellow coralline or aurine. It was our firm who first, in 1863, discovered that rosolic acid thus prepared could be employed directly as a dye, and introduced it to dyers under the name of aurine. This substance gives to silk and albuminised cotton magnificent orange colours, like those of basic chromate of lead or of turmeric. In 1860 M. Persoz, junior, discovered also that if rosolic acid was heated under pressure with ammonia it gave rise to a red substance, which he called péonine. Messrs. Guinon, Marnas, and Bonnet perfected the manufacture of péonine, and gave it the name of red coralline. This colouring substance gives to silk and worsted a flame-coloured tint and very brilliant scarlets. This firm were also the first to produce and introduce, towards the end of 1860, a blue dye, derived from carbolic acid, or, more so, rosolic acid, which they called azuline. Azuline is obtained by heating for several hours, at the temperature of about 180 degrees, a mixture of rosolic acid and aniline. It is only necessary then to treat this product with sulphuric acid, and to wash it with benzine, to produce a beautiful blue colouring matter, which presents, when dry, a red mass with gold-coloured tints. Azuline, although discovered before the aniline blues, which have since become formidable rivals to it, is still, I may add, manufactured in competition with them.

To Messrs. Guinon, Marnas, and Bonnet is also due the first production of a green derived from coal tar products. It was manufactured in 1863, therefore some months before the appearance of an aniline green, known as vert d'Uzèbe, which, however, with the exception of the iodine greens, is the only one now employed in dyeing. Viridine was obtained by this firm from a mixture of aniline, benzoic, and rosolic acids.

Phenicienne, discovered in 1863, by M. Roth, is another colouring matter derived from phenic acid; it produces fast colours, from a deep garnet red to a golden buff. Phenicienne is produced by the action of nitrosulphuric upon carbolic acid. I will now, with your permission, gentlemen, leave for a few seconds the products derived from phenic acid, in order to place before you certain claims to some inventions not sufficiently recognised by writers on aniline colours.

In 1860, Messrs. Clift, Lowe, and I, took out a patent for the direct production on prints, of a green called emeraldine, and the deep blue called azurine, a blue which resembles indigo, and which really, when printed in a concentrated form, may be confounded with a black. And although I do not desire to deprive Messrs. Lightfoot, Carlos Kœchlin, and Lanth, of any of the merit which belongs to them for the production of the beautiful black which everyone must have admired in the Exhibition, still I may be permitted to remark that their process is based upon the oxydation of aniline by chlorate of potash, and is therefore based on our patent, previously secured to their discoverers. The difference between their process and ours consists in the addition of a salt of copper, which addition is so important that I have no hesitation in saying it has decided the success of a black which now stands unrivalled.

I cannot conclude this retrospective review without calling your attention to a fact which seems to have escaped my colleagues; it is that the majority of the beautiful colours obtained from aniline are due to the industrial application of a discovery made by your illustrious president, M. Dumas, more than thirty years since. The discovery I mean is the principle, so rich and fruitful, which he named the law of substitutions; a law which has thrown so bright a light on modern chemistry, and which has prepared the way for such brilliant achievements, and which, I say, has also been the foundation of the production of the beautiful colouring substances which we all so much admire. Thus, in order to obtain aniline blues, violets, and greens, produced by the methods devised by the illustrious chemist, Dr. Hofmann, we substitute for a certain proportion of the hydrogen of rosaniline, an equivalent quantity of the alcoholic radicals, called phenyl, ethyl, methyl, and amyl. Further, this celebrated chemist has also shown that the blue obtained by Messrs. Girard and Delaire are also due to the same laws.

I am far, I regret to say, gentlemen, from having named all the remarkable properties and applications of carbolic or phenic acid; but I trust I have succeeded in making you share my enthusiasm for this valuable agent, which, after having rendered important services to most of the world's industries, still offers to chemists and to manufacturers a wide field for new applications.*

EXPERIMENTS WITH NITROGLYCERINE.

By C. A. Richter, of Freiberg.†

The following is an account of the results of a comparison of the effects of nitroglycerine and the nitrate of soda gunpowder, which is used in this neighbourhood.

The first experiment was made under the guidance of one of the inventor's agents in the year 1865.

Beihilf shaft, which was being sunk 30ft. long by 8ft.

* Dr. Calvert has supplied the Editor with the following additional remarks, explanatory of the distinctions between *deodorizers*, *disinfectants*, and *antiseptics*:—

We beg to offer the following remarks in reference to the peculiar advantages which carbolic acid possesses as an antiseptic, disinfectant, and deodorizer, as compared with substances which act only as disinfectants—such as bleaching powder and sulphurous acid, or with those substances which are deodorizers—as chloride of manganese, green copperas, nitrate of lead, &c.

Deodorizers.—All substances merely acting as such are neither disinfectants nor antiseptics, as they simply remove the noxious gases emitted from organic matters whilst in a state of decay or putrefaction, and as they do not possess the property of arresting decomposition or fermentation, it is no proof that the source of infection has been destroyed, for noxious smells and offensive gases are not themselves the real source of contagion, but merely indicators of its existence—the real source of disease and contagion being due, as proved by the latest investigations in science, to microscopic spores floating in the atmosphere, and which by their ulterior development and propagation, are believed to be the true source of contagion.

Disinfectants.—Under this head may be classed bleaching powder or chloride of lime, sulphurous acid and permanganate of potash: they first act as deodorizers, and then as disinfectants, because if employed in large quantities they will so thoroughly oxidize or act upon organic matters as to prevent them from again entering, at least for a short period, into decomposition, but if the organic substances so acted upon are exposed to the atmosphere, they will again experience decay and putrefaction.

Antiseptics.—Antiseptics, such as corrosive sublimate, arsenious acid, essential oils, carbolic acid, &c., act as such by destroying all source of decay and decomposition, that is to say, they will destroy or prevent the formation of the germs of putrefaction and fermentation, without acting upon the mineral or vegetable matters present. The advantage of their use is, therefore, that they act, when used in small quantities, upon all organic matters in a state of decay; further they are deodorizers, for they prevent the formation of offensive odours, and consequently they may be considered as antiseptics, disinfectants, and deodorizers. The great advantages which carbolic acid possesses over all other antiseptics are, that it cannot be used for any illegal purpose, as arsenic and corrosive sublimate; and further, that its antiseptic properties are so powerful, that a few thousandths of it will effectually prevent the putrefaction of substances such as glue, blood, urine, fæces, and the fermentation of all vegetable matters, such as flour, starch, sugar, &c., &c.

Owing to the inducements which have been held out by some traders, large quantities of a fictitious mixture have been sold to the public as carbolic acid. To enable purchasers to protect themselves from fraud, the following test is supplied on the authority of Mr. W. Crookes, F.R.S.:—"Commercial carbolic acid is soluble in from 25 to 70 parts of water, or in twice its bulk of a solution of caustic soda, while oil of tar is nearly insoluble. To apply these tests:—1. Put a teaspoonful of the carbolic acid in a bottle; pour on it half a pint of warm water; shake the bottle at intervals for half an hour, when the amount of oily residue will show the impurity. 2. Dissolve one part of caustic soda in ten parts of warm water, and shake it up with five parts of the carbolic acid. As before, the residue will indicate the amount of impurity. These tests are not given as having any pretension to scientific accuracy, but as affording persons who are desirous of using carbolic acid a rough and ready means of seeing whether or not they possess the right article."

† Translated from the "Berg-und hüttenmännische Zeitung," August and September, 1867.

wide, was chosen as a suitable place for the experiments. The shaft was being sunk in the "country" (*i.e.*, not on the vein), which consisted of hard grey gneiss, now and then only it had a few joints, which rendered the work easier. This happened to be the case on the day of the above-mentioned experiments, and partly explains the extraordinary effect produced by the nitroglycerine. The effect was indeed extraordinary, because boreholes, placed so as to give them twice as much to do as usual, and even more, did their work perfectly, and, indeed, more than sufficiently, for they caused such an accumulation of stuff in the shaft that for three days no more boring could be done, and the men had to devote themselves entirely to winding up the stuff. The holes were bored partly single-handed, and then one inch in diameter and 27 to 30 inches deep, partly by two men, and then two inches in diameter and 36 to 48 inches deep. The holes were charged in the mode originally adopted by the agent. As all the holes looked downwards, the nitroglycerine could be poured in by means of a tin funnel. Upon the top of it a small wooden cartridge, three inches long, containing a little powder, was let down by means of the Bickford's fuse, to which it was attached, and then the hole was filled up by hand, without using any tool at all, first with mud and then with sand or small stuff.

It appeared from these first experiments with nitroglycerine that, without any exaggeration, its power was four or five times greater than that of the powder hitherto in use. From this it naturally followed, as the advantages of a powerful explosive material would be most felt in large workings in close little-jointed rocks, such as sinking a shaft in the "country," that such workings could be carried on much faster than had previously been the case. This advantage which nitroglycerine afforded could only be looked upon as most important.

Besides, other advantages were apparent, which, it is true, did not seem so great as the first, but which, nevertheless, promised to exercise a decidedly favourable influence on the economy of mining. They may be summed up as follows:—

1. Fewer men are wanted for working out a certain sized piece of ground, and fewer holes have to be bored than at present. A dearth of miners may to a certain extent be remedied in this manner, and less steel and iron will be used than hitherto.

2. Nitroglycerine does not take fire easily, and when lighted burns but does not explode, and goes out as soon as the flame with which it had been brought in contact is taken away.

3. The holes can be tamped easily, quickly, and without danger.

4. The amount of smoke after a blast is small compared with that of powder, and workmen can go back at once to the place where they have blasted without trouble. This is a considerable advantage in places where there is but little draught, and holes can be bored and fired singly, which was hitherto almost impossible in consequence of the all but impenetrable smoke, and had to be avoided as much as possible.

5. Holes that have missed or only partly torn can be retamped and shot off, which, with the present arrangements is either impossible or accompanied by great danger.

Against these advantages must be set the following disadvantages:—

a. The gases formed during the explosion of the nitroglycerine have an injurious effect on the organs of sight and respiration.

b. Nitroglycerine explodes on being struck smartly, and easily freezes.

c. The masses of rock which it removes are mostly very large, and considerable time has to be spent in breaking them up.

With regard to the first of these disadvantages, it should be remarked that during the first day's experiments, scarcely any signs of pain in the eyes or head were remarked, although the bottom of the shaft was not particularly well ventilated; later they grew more and more marked, so that it became gradually more apparent that where nitroglycerine was used every effort should be made to secure good ventilation. In the course of time, however, the workmen seem to have become accustomed to the smell, and this disadvantage of the nitroglycerine was no longer looked upon as one which need restrict its employment.

The dangerous property of nitroglycerine of exploding from a smart blow, cannot be denied, but this is not more dangerous than the property of ordinary gunpowder of taking fire readily and exploding; and again, the fact of its freezing must be looked upon rather as an inconvenience than a danger.

We must allow that the last of the three disadvantages also exists; holes blasted with nitroglycerine throw down large masses rather than small. These may esaily be broken up with a sledge, or, if necessary, be blasted. At all events, it is no greater disadvantage than what happens so often with powder; the rock is blown into small pieces, which are sometimes thrown to a great distance, and may perhaps do damage, not only to the workings but also to the miners. On the contrary, it would seem to be rather an advantage than a disadvantage that the rock should be thrown down gently and without danger, because the workmen, the timbering, and masonry are not so liable to be injured as in blasting with powder.

All the results of the first trials with nitroglycerine were so favourable, that they naturally instigated us to obtain further and more certain proofs of the possibility of practically employing nitroglycerine underground. A comparative experiment was made between the nitrate of soda powder in use here and nitroglycerine at Segen Gottes mine, in sinking a shaft, in driving a level, and in stopes. The nitroglycerine was tried first; 226 holes were bored, in all 5,043 inches (English) deep. Of these holes, 180, or 80 per cent., tore perfectly, 40, or 17 per cent., only half, whilst 6, or 3 per cent., did nothing. 9·302 cubic fathoms (English) of ground were removed; the smith's cost was £1 6s.; blasting materials cost 17s. 1¼d.; nitroglycerine, £11 11s. 6d.; wages, £23 12s. 9d.; so that the cubic fathom cost £4 0s. 4d.; the end, on account of its small dimensions, costing comparatively the most, and the sinking of the shaft, for the opposite reason, being the cheapest work. The experiment with the nitrate of soda powder was then made; 559 holes were bored, in all 9,249 inches deep, or 333 holes, with a depth of 4,206 inches more than in the previous experiment. 315, or 57 per cent., tore perfectly; 225, or 40 per cent., only half; and 19, or 3 per cent., not at all. By means of these holes, 6·036 cubic fathoms of ground were removed, in which the end and the stopes do not stand anything nearly so far behind as in the first case. The smith's cost was £1 18s. 2d.; blasting materials, 9s. 7d.; powder, £3 13s.; wages, £24 7s. 10½d.; so that the cubic fathom cost £5 0s. 9¾d. With powder, therefore, 3·266 cubic fathoms less ground were removed, though the wages (in spite of one case of loss of wages) were 15s. 1½d., and the smith's cost 12s. 2d. more; on the other hand, on account of using the needle in blasting, the blasting materials cost 7s. 6½d. less; the powder also cost £7 18s. 6d. less than the nitroglycerine. Taking all together, the cubic fathom with powder cost £1 0s. 5¾d. more than it did with nitroglycerine.

These experiments show that the employment of nitroglycerine, especially in large workings, already offers great advantages over ordinary powder, and that these advantages lie in the fact that with fewer holes, and in a shorter time, a greater amount of ground can be removed than by the present mode of proceeding. Besides, in working out any given quantity of ground nitroglycerine is found to do the work much cheaper, on account of the extraordinary force with which it blasts the holes, and the smaller quantity of iron and steel used up. Lastly, the holes can be tamped much quicker and with-

out danger, as if they are loosely filled with sand, any small stuff, or even water, they can be considered as thoroughly well tamped. But even a stronger tamping, such as is in use in the Hartz, has, up to the present time, been entirely exempt from danger, and has doubtless caused a greater effect, under certain circumstances, as may be readily understood. In the Hartz, the cartridges, made of well-glued paper, are filled with sand in order to make them stiffer, and especially to allow their being longer, and thus to spread the explosive force over a greater area; in other words, to give the explosive force a greater leverage, and thus increase the effect. The proper quantity of nitroglycerine for each hole is then poured into the cartridge by means of a little can with a spout, until the sand is more than saturated, and the whole of the nitroglycerine forms one single mass; on the top a little sand is put so as to close the cartridges better, and then the upper part is pinched up just as in the cartridges filled with powder. Where nitroglycerine is used alone, without sand, the cartridges are made long and narrow for the reason explained above; they are closed with a cork. The cartridge in either case is carefully let down into the hole, or pushed in with the tamping bar, or scraper. Upon the top of it comes a paper cartridge, about two or three inches in length, not particularly strong, and filled with good powder, such as sporting powder: it has the ordinary iron needle stuck in it, but without the reed; a little clay is stuck on the top of the cartridge and round about the needle. The tamping employed is clay-slate beaten up fine, and made into a soft mass with water; this is moulded into lumps like pieces of peat, and when dried is ready for use. This tamping is forced in with the iron-tamping bar, the wooden one being discarded; the first blows are gentle, and then gradually harder and harder until the mass rings. The hammer, however, is not used, the tamping is simply rammed in with the iron bar. When the hole is tamped it is clayed over, the needle drawn out, and instead of the reed filled with powder, a paper fuse is stuck in and the hole fired off.

The results obtained by the experiments described above would probably have been greater had the workmen been as thoroughly accustomed to the use of nitroglycerine as they are to that of powder. This may be inferred from the fact that far fewer holes were bored in the experiments where nitroglycerine was used than in those where powder was the blasting material employed. For though it must be conceded that holes blasted with nitroglycerine brought about more delay, and caused more time to be spent in winding stuff, and thus caused a loss of time, still the difference in the number of holes bored is so great that we may assume that the men would have bored more holes if they had had more experience in the mode of procedure adopted with nitroglycerine.

The same thing no doubt happened when gunpowder was first introduced, and probably less work could be done with it, and much more danger accompanied its employment, than has since proved to be the case.

In speaking of the many advantages which, according to these experiments, nitroglycerine possesses over gunpowder, it may be added that still further progress has been made with regard to its introduction, and people have not been stopped even by two accidents which have occurred from using it. In one case walls to keep up the attle heap were being built out of some large pieces of rock brought up from the Beihilf shaft, and which had been lying out in the air for some time. These pieces had to be trimmed a little with the hammer, and during this work a small explosion occurred, slightly injuring the mason in the eye.

The explosion was probably caused by some nitroglycerine which had escaped decomposition and remained sticking to the rock. In the second case a hole in the mine did not tear the rock properly but simply split and loosened it. As the miner was removing these loose pieces an explosion occurred from undecomposed nitroglycerine which remained in the cracks. Luckily, the man was but slightly injured.

The accidents can only have occurred from the nitroglycerine having been used alone without any cartridge, or from the hole not having been properly clayed, so that the nitroglycerine found means of getting into joints and cracks and escaped decomposition. The consequence has been that nitroglycerine is not so often poured straight into the hole, but is enclosed in a cartridge of paper well joined with glue, and in order to give the cartridge greater strength, and the explosive material a greater area to act on, the cartridge is first of all filled up to a certain height with sand, or, as I have since tried, it is at once filled with common powder.

Now, although it has been remarked that a hole containing free nitroglycerine does more work than one in which the blasting oil is contained in a cartridge, which somewhat hinders the quickness of its decomposition, it must not be assumed that the real reason has yet been hit upon, and before a final decision further evidence must first of all be obtained.

Further experiments were made in the above-described manner in sinking a shaft in clay slate. During a period of three months the men were paid for having worked 372 shifts, £13 15s. 9½d., or, adding in the money paid for extra work, £2 10s. 0¾d., altogether £16 5s. 10¼d. 251 holes, with a total depth of 7,520 inches, were bored, and 11·972 cubic fathoms of ground were removed. Of these holes 229, or 91·2 per cent., tore perfectly; 18, or 7·2 per cent., only half; and 4, or 1·6 per cent., simply blew out, but could be used again on being recharged. In each shift, then, ·67 of a hole, or 20·2 inches were bored, and ·0321 of a cubic fathom of ground removed, which cost 9d., or, including the extra wages, 10½d. The smith's cost was 9s. 4d.; blasting materials, 16s. 5d., and the expense of 99·67 pounds of nitroglycerine £17 18s. 9¾d; so that the total expenditure was £35 10s. 5d., or £2 19s. 3½d. per cubic fathom.

The results of these experiments are still more favourable than those obtained previously, and the reason of this lies in the fact that the experiments were confined to a shaft which was being sunk of greater length and breadth than the previous one, and, consequently, the full effect of the nitroglycerine was obtained. The sinking of the shaft in question has been consequently continued with the aid of nitroglycerine, and with excellent results, for the holes do quite three times as much work as they did with gunpowder. The sinking of course proceeds more rapidly; the complaints about headaches caused by the nitroglycerine have ceased, and no other inconveniences have manifested themselves. It must not be denied that this favourable result is partly owing to the length and breadth of the shaft, the tight nature of the ground, as well as to the porous nature of the clay-slate, and the wetness of the sinking. Still some means should be discovered to lessen or prevent entirely the injurious effect which nitroglycerine has on the health of the workman. If further experience does not bring any other disagreeable qualities to light, there is no doubt that nitroglycerine will be more generally introduced in certain workings to which it is specially adapted, and then further improvements may bring about still more important results than those which have already been obtained in certain cases.

A NEW MODE OF CONSTRUCTING THE SURFACE OF STREETS AND THOROUGHFARES.

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The wear and tear of an ordinary macadamized road, and, consequently, its cost of maintenance, are very great.

The explanation appears from experiments which

* Read before the British Association at Dundee.

show that a cubic yard of macadamised stone, when well pressed down in a box with a capacity of 27 cubic feet, contains 11 cubic feet of vacuities; and that a roadway covered with 12 inches of metal, before it is consolidated into a smooth and useful surface, has a large portion of its stones crushed into small particles, and that more than one-third of its dimensions consists of mud and sand. When heavy rains occur, combined with heavy traffic, disintegration of the stones in such a roadway takes place, and quantities of mud are generated in proportion to the amount of traffic.

In the new mode of constructing a roadway which I propose, the vacuities in the metal are filled with cement grout, which, when hardened, forms a concrete, binding together the macadamised stones into a mass impervious to water, and, unlike asphalte, unaffected by heat; while, at the same time, it preserves entire the original size and dimensions of the stone.

Again, everyone must have noticed the tear and wear of the causeway stones in an ordinary street pavement, and the irregularities of the surface of the streets, after six or twelve months' traffic. Granite and other stones of the hardest quality appear to give way under the weight of the traffic. The explanation of this waste may be found in the ordinary mode of constructing street pavement. The stones are laid on a bed of loose sand some two or three inches deep above the soil, and are then beaten down into an approximately even, but really irregular, surface. They are laid $\frac{3}{4}$ths of an inch to $1\frac{1}{2}$ inch apart, and the intervals between them are filled up with sand (which is soon reduced to mud). Thus, each stone is insulated, and made to rest on a yielding surface.

In a street so constructed, the ends of the causeway stones are found, after 12 months' traffic, to be worn down from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch. This arises from the percussion of the wheels of carts and carriages falling from the centre of one stone on to the joint of the two adjoining, which, being on a yielding surface, and the wheels striking on the ends, sink a little from the pressure. When a stone has sunk bodily from $\frac{1}{2}$ inch to an inch, or when a little hollow occurs in the pavement of the street, it will commonly be found that the adjoining stones are much worn, the hollow on the surface increasing the force and effect of the percussion of the wheels. The greater the hollow the greater is the tear and wear from the strokes of the wheels.

The source of waste is seen to be the yielding surface on which the stones are laid. To prevent their tear and wear, what was wanted seemed to be a rigid and perfectly regular surface, by which also the traction might be greatly improved.

These defects in the construction of causeway have long been noticed, and the only remedy hitherto used, and which has been in very general use (but which has always failed), has been, to lay a body of lime concrete, six inches deep, below the stones, and to fill with lime grout the joints or intervals between them. The lime, it has been found, has never consolidated, owing to the stones being beaten down when it is half set, and to the tremor subsequently caused by the traffic. Thus, on the best paved streets, after heavy rain or watering, much mud is generated from the wet unconsolidated lime and sand. Where there is much traffic, as in London, this mud on the surface, in drying, proves slippery and dangerous, and many serious accidents occur in consequence.

The irregularities of the surface, and consequent mud, are increased by two inches of sand being placed between the bed of lime concrete and the bottom of the paving stones.

In the new mode of constructing street pavement which I have proposed, there is first laid down a bed of cement concrete three inches deep (gravel may be used instead of macadamized stone where abundant and cheaper), and to the requisite convexity in the cross section. This concrete quickly consolidates, and entirely excludes moisture or water from below.

On this foundation, the paving stones, five inches deep and three inches wide (a width of three inches gives a better hold to the horses' feet than a width of four or four and a-half inches, which are the common sizes), are built, and when brought to a perfect form, the joints are filled with cement grout. When the whole is consolidated, it forms a surface perfectly immoveable by traffic, and impervious to moisture. The wear and tear of the stones arise from the attrition of the traffic only. If the causeway be well made, there should be no irregularities on the surface. Where such irregularities exist, they are due to defective workmanship.

Three experiments have been made to test the merits of the new or concrete road, and two to test the merits of the new form of causeway.

The first trial road and pavement were laid down in Inverness, early in 1865. They have been under traffic for upwards of two years, being passed over by the whole goods traffic of the Highland Railway. The road is now perfectly sound, and it has required no repairs; whereas the macadamized roadway adjoining it has constantly required repairs, and is now full of irregularities and ruts.

The second trial new road was laid in London. As it was important that this plan of roadmaking should be subjected to the test of severe traffic on some of the London thoroughfares, I applied to, and obtained permission from, the Right Honourable William Cowper, Chief Commissioner of Works, to lay down 100 yards of it in length, by 35 in width, on the Mall in St. James's-park, at the foot of the Green-park. The whole traffic between the district of Regent-street, Piccadilly, Pall-mall, Buckingham-gate, and the Victoria Station, passes along this route, which is, apparently, subjected to as heavy traffic as any thoroughfare in London.

Subsequently, this road proved a failure, the surface breaking up under the traffic. My explanation of the failure (which was very puzzling at first) is as follows: — The roadway at each end of the experiment was macadamized at the time the experiment was made, and the contractor's men, who were crushing the macadamized road with a heavy roller of three to four tons weight, were inadvertently permitted by the person in charge to pass their heavy roller from end to end continuously over the experiment before it had properly consolidated. The crystalline structure of the cement was injured by this, and in consequence the surface yielded to the incessant cab traffic, and the month of continuous rain to which it was immediately thereafter exposed. The surface was repaired by the trustees, by a coating of two inches of macadamized stone, which was rapidly ground down on the hard concrete by passing vehicles. As the bottom was entire and consolidated, had a coating of two or three inches of new concrete been laid down, with the required time to consolidate, it would have answered all the purposes contemplated; but the surveyor deemed it his duty to remove the concrete surface entirely, which was only done at great trouble, by means of levers and iron crowbars. The experiment was certainly a failure; but, in attempts of realizing new conceptions, it is in the nature of things that there must be repeated failures before success is reached.

The third experiment was made in Edinburgh, and has, in my opinion, proved very satisfactory and successful. A length of 150 feet of concrete road by 45 feet in breadth, and a similar extent of street pavement, were laid down last summer at George IV. bridge, where the traffic is heavy and continuous. One half of the street was laid down with the concrete at a time, and the traffic was rigidly kept off that portion for a month. The other half was then laid down. The whole roadway has since been under traffic for 12 months, and has proved perfectly sound and immoveable, not a stone turning up all that time. After the road had consolidated, and had been under traffic during the winter, it was observed that some small hollows had shown

themselves at the joinings along the centre of the roadway; this arose from our inexperience in laying down the concrete, and will in future be avoided. These hollows were cut out, and made up with new concrete, and opened for traffic in a week. The result has been that the surface is now perfectly smooth and regular.

The street pavement on the south end of the concrete road was then laid down on a bed of cement concrete three inches deep.

The cement concrete was permitted to consolidate for about ten days, and thereafter the pavement was built on it with cement mortar; and when the stones were regularly set, the joints were filled up with cement grout.

The pavement has also been perfectly successful, the water running off it as from a foot-pavement, leaving no mud; and the only wearing of the surface is from the attrition of the traffic.

It has been stated that the noise of vehicles on the pavement is greater than on the ordinary pavement. I do not consider it greater: The blows arising from the irregularities on the ordinary pavement are noisy, as well as destructive to the road and to carriages; but the noise on the concrete pavement, though not greater, is different, it having more of a ringing sound, like that on a street bound up with frost.

In point of wear and tear, and freedom from mud and dust, this street pavement has many undoubted advantages over that now in common use, particularly where there is heavy traffic; but I anticipate that a road consisting of a good body of concrete would supersede even this species of street pavement.

The following is an extract from a report made by me to Mr. William Duncan, Secretary to the Edinburgh Road Trustees.

"The concrete road cost 6s. 8d., and the paved road 17s., per square yard. A sum of 1s. 8d. per square yard was incurred for excavating and removing the materials of the old road, and for watching; but I calculate that the value of the old materials would go to meet these outlays. The small experiment that has been made, however, is not a good criterion of the cost. In a work on a large scale, the cost ought to be less.

"The advantages offered by this mode of construction on a road under heavy traffic, as far as our experience has gone, are—

"First, diminished tear and wear. The general surface is apparently not worn in twelve months more than one eighth of an inch.

"Second, superior cleanliness. The road is almost wholly free from mud and dust.

"Third, diminished cost and annoyance from repairs. The road has required little or no repairs for twelve months. It requires no scraping or watering; and its maintenance is almost nominal, while the coatings, scrapings, and waterings of a macadamised road under similar traffic in Edinburgh, cannot be done under 1s. to 1s. 6d. per square yard per annum, besides the great inconvenience and discomfort they cause to the public.

"The original cost of a macadamised road nine inches deep, which, before it is consolidated, is crushed into six inches of available material, is about 2s. per square yard, or say somewhat less than one third of the concrete road. In London, where the metal is 20s. the cubic yard, instead of 6s., as in Edinburgh, and where the cement is cheaper, the cost of a road of nine inches of metal will nearly amount to the cost of a concrete road.

"It thus appears that the cost of the concrete road will be proportionally less, and its advantages proportionally greater, in London and towns similarly situated, than in Edinburgh.

"The cost of the concrete pavement, which is 17s. per square yard, is higher than it should be, as the stone was procured from Aberdeen instead of the neighbourhood of Edinburgh, and gravel would have served for the concrete bottom quite as well as the more expensive macadamized stone.

"In conclusion, I consider that the experiment which, through the liberality and public spirit of the road trustees, I have been permitted to make on this most important subject, has been successful—the road having sustained the traffic on George IV. Bridge without a stone being moved for 12 months; and that it only requires further experience in the manipulation and laying down of the concrete to accomplish all that I anticipated from this new mode of road-making."

Since the date of this report, Messrs. Wylie and Slight, engineers in Edinburgh, have been good enough to make experiments which show that the new road possesses another advantage over the old. It was natural to anticipate, that, from the superior evenness and solidity of the new road, the traction would be less upon it than on common roads; and these gentlemen have found that the traction on the concrete road of a waggon two tons weight, against a gradient of 1 in 80, was 70lbs., while, on a common macadamized road of the same grade, wet and muddy, it was 140lbs., or double that on the concrete road. On a road with wheel-tracks through new metal, it was 340lbs.; and on a road newly covered with metal, 560lbs. The gradients of these several roads were 1 in 80.

The experiments are to be further prosecuted, as the dynamometer got injured; and I have every confidence that they will establish the very great superiority of the new road as regards traction—a circumstance affecting the preservation of horses and carriages, and the comfort of travelling. Many experiments will yet have to be made before the merits of the new road and pavement can be held to have been conclusively tested. In particular, it will be necessary to have an experiment on a large scale before the cost of construction and maintenance of the new road can fairly be put in comparison with the cost of construction and maintenance of the roads now in use. But, in the meantime, so far as my experience has gone, I feel entitled to sum up the advantages of the new roadway over the old, in the four following propositions, viz.:—

1st. The tear and wear are less on the new road than on the old.

2nd. The cost and annoyance of repairs are less.

3rd. The mud and dust are a minimum quantity, and there is superior cleanliness.

4th. The traction is less, as has already been proved.

It must be observed, however, that the entire efficiency of this mode of road-making depends on the quality of the cement, which should be the best Portland cement, tested to bear a tensile strain of 500 to 600 lbs. on a bar $1\frac{1}{2}$ inch square. Time, after the road is made, is a great element of efficiency, as the hardness of the concrete gradually doubles in the course of 12 months; but further experiments are necessary to determine the precise time the road should be left for consolidation before it is opened for traffic—a month I found quite sufficient in Edinburgh.

FRIENDLY SOCIETIES IN ENGLAND AND WALES.

The annual report of the registrar of Friendly Societies has just been issued. Setting out in due order with those societies which are generally denominated "Friendly Societies," Mr. Tidd Pratt reports that he has had submitted to him for certification the rules of 1,176 new societies and alterations of rules of 1,487 existing ones, making a total of 2,663 certificates. Forty-three societies, not certificated, have deposited their rules with the Registrar, and, under the provisions of 18 and 19 Vic., c. 63, sec. 44, have obtained protection for their funds against fraudulent officers. Notices of dissolution of 130 Friendly societies have been received, and 83 of them advertised in the *London Gazette*. Concerning the dissolution of these societies, Lord Lichfield, in the latter part of the last session of Parlia-

ment, moved for returns exhibiting the number of societies which had been registered under the Friendly Societies' Acts since the passing of the first of these Acts in June, 1793, and of the number dissolved, and also a supplementary return from the Poor-law Board, showing the number of persons who have become chargeable to the parish, and are paupers in the workhouse, who have been members of friendly societies which have been dissolved or broken up. These returns show that in England and Wales 38,315 societies have taken the benefit of the provisions of the Friendly Societies Acts since June, 1793, and that of these 13,935 have been dissolved, and that those remaining number 24,380. The number of paupers who have been members of dissolved friendly societies is stated at 3,931 in England, and 84 in Wales, a total of 4,015 coming under the immediate notice of the Registrar.

Three or four years ago the public was startled with the revelations Mr. Tidd Pratt made in his annual report, of the proceedings of certain societies (chiefly societies held at public-houses) which periodically made returns to him, and had the effrontery year after year to publish in their accounts the record of expenses illegally incurred in feasting and drinking. A great portion of that illegality has now disappeared, but in its place the Registrar has now to call attention—as he has, in fact, before done—to the excessive expenditure of some so-called friendly societies under the head of "management."

The Royal Liver Friendly Society, established at Liverpool in 1850, returns its gross receipts at £125,181, its management expenses at the enormous sum of £45,857. As the Registrar points out, out of every £100 received £36 12s. 9d. is spent in management. Its sickness and burial expenses amounted to £60,880; and in proportion to every £1 spent under this head, 15s. 1d. was spent in expenses. The accumulated funds amount to £103,355, but, as in former years, the officials declined to furnish the Registrar with the number of its members, and he is thus unable to make any comparison as to the value per member. Another society, the St. Patrick's (also established at Liverpool), expends £49 15s. out of every £100 it receives in management expenses, and that its resources are very large may be estimated by the fact that £33,270 is returned as its gross income for the past year, and its accumulation as only £17,797, the property of 150,000 members—about 2s. 4d. per head. The Victoria Legal Friendly Society returns its income at £28,431, and its expenditure at £24,140, and its funds at £10,544.

"The Royal Liver," and similar societies, the Registrar points out, should at once become the subject of exceptional legislation, as they depart almost entirely from the original idea of a friendly society. "It is notorious" (says the registrar) that great hardships are suffered by the persons who join them; that the members are generally poor, that they are spead all over the kingdom, frequently hundreds of miles from the office of the society; they never participate in its management, and the whole business is managed by a few collectors and a central and irresponsible board, over which the secretary reigns supreme, and not the slightest check can be obtained over him. In these societies, in case of death it frequently occurs that a dispute is originated as to whether the member was or was not within benefit (as it is termed) at the time of death, but as in this dispute, on the one side is the society and the secretary—with its large funds and irresponsible manager, on the other, people of the class who generally live "from hand to mouth," it is quite clear that the weaker party has to give way, and any idea of obtaining legal redress is quite out of the question at present." The Registrar reports that he had found it necessary to call upon the officers of the Farriers' Society, London, to reimburse certain sums of money—£63 10s. 3d.—which they had illegally expended in the reform demonstration, and that his threat of legal proceedings had been effective in causing the officers to repay the money to the funds of the society.

It appears that out of 23,407 societies only 10,678 returns had been made, and that these returns showed the number of members to be 1,672,176, having accumulated investments to the amount of £6,668,386, of which £1,776,215 was deposited in savings' banks; and that 518 societies had invested directly with the Commissioners for the reduction of the national debt the sum of £1,799,648.

The Registrar reports that savings' banks, co-operative societies, and loan societies being so much connected with the industrial classes, he has thought it right to include in his report statistics relating to these institutions. The number of individual depositors with the old savings' banks in 1866, were 1,376,870; and the amount of their investments was £33,840,096. The number of persons depositing in the post-office savings' banks was, on the 31st December last, 746,254; and the deposits then due to them amounted to the large sum of £8,121,175. The Registrar reports the continued success of these new banks—as may be judged from the following facts:—that in 1866, 186 new postal banks were opened, swelling the total number to 3,507. There were 1,525,871 deposits received, amounting to £4,400,657. The average amount of each deposit was £2 17s. 8d. The withdrawals were 515,348 in number, and £2,975,055 in amount. The average cost of management was 6d. 9-10th for each transaction, 1-10th of a penny less than the cost estimated before the commencement of business. The average cost in the old banks ranged from 10d. to 1s. At the end of 1866, there was standing to the credit of the postal banks (chiefly investments with the National Debt Commissioners) £8,256,968, and the liability to depositors was £8,125,175, showing an excess of assets over liabilities of £135,793, and exclusive of the dividends receivable five days after the account closed. This result is most satisfactory, and shows in the most striking light the great advantage of these banks as providing a means of secure investments for the savings of the labouring classes; and how ready that class is to avail itself of the inducements held out to it. In connection with this system, the plan of Government insurance and annuities appears to be fast gaining ground. From the 17th April, 1865, to the 31st December, 1866, 1,168 contracts for insurance had been made, and the amount assured to policy holders for 1,150 which still remain in existence, is £86,593. The sum received by way of premiums thereon amounts to £4,004 12s. 1d., collected in 4,858 payments. The cost of collection is estimated at £636; and only one insurance had become a claim, and the amount paid thereon was £70 7s. 6d. In the annuity branch during the same period 280 contracts for immediate annuities, assuring £6,427 13s. 6d. per annum, had been granted; and the purchase-money paid to Government for the contracts amounted to £71,568. Forty-four contracts for deferred allowances—under the tables "Money not returnable," and 73 under those headed "Money returnable," had been entered into. The annuities to be purchased amounted to £2,338 15s., but 10 of the contracts had been dropped from various causes, and the amounts had been thereby reduced to £2,129 5s. The total amount contributed by purchase of annuities, immediate and deferred, was £75,756.

Under the head of "co-operative societies," the Registrar reports that the returns for the past year made by 436 of these societies show the number of members to be 173,243, an increase of 22,661 during the year; that their invested share capital is £1,048,096, of which £619,688 has been contributed during the year. The result of the cash transactions is shown as follows:—Goods bought, £3,986,754; goods sold, £4,455,569; profits realised, £376,294; and management expenses, £235,454. The value of the assets of the societies is estimated at £1,009,849, and their liabilities are estimated at £334,561.

Commerce.

Tea in Ceylon.—*The Produce Markets Review* says:—"Mr. Arthur Morice, who has been visiting the tea districts of India, with a view of ascertaining the capabilities of Ceylon as a tea-growing country, has published his report on the subject. As regards soil, Ceylon appears to possess none precisely similar to that described as suitable for the cultivation of tea, but Mr. Morice arrives at the conclusion that there is nothing in the soil to prevent successful cultivation. With respect to climate, the *Colombo Observer* says a great diversity of opinion prevails, and according to what writers have hitherto said it might be supposed that Ceylon is too near the equator to prove a successful tea-growing country. Mr. Morice, however, successfully combats this idea, and although he acknowledges that Ceylon does not in any part possess a climate similar to that of China, Assam, or the Himalayas, yet a comparison with Java (in the corresponding degree of south latitude) and the result of cultivation there, show indisputably that a tropical climate, where the proper elevation can be obtained, is not inimical to the tea plant. Mr. Morice remarks, 'I have come to the conclusion that, at the higher elevations of this island, both soil and climate are sufficiently near those of known tea countries to induce the belief that tea can be grown so as to produce regular crops, and sufficient in quantity to prove remunerative; and that, in all probability, the quality, with proper manipulation, will be such as to enable it to compete with other Indian teas. Tea, in short, is worthy of a fair trial; but, to do the trial justice, the hybrid Assam tea plant should be employed solely. This plant combines the hardiness of the China with the superior producing powers of the Assam parent; besides, the hybrid comes into full bearing at least two years before the China plant, under similar conditions.' The subject of tea cultivation in Ceylon is now receiving much attention, and if the soil and climate of the island are, as is stated, so well adapted to the growth of the plant, there is a possibility that in a few years' time we shall have another country's produce competing in the tea market."

Exhibition of Wines at Alessandria (Italy).—An exhibition and wine-fair is about to be held at Alessandria (Italy); it will be opened from the 24th of November to the 2nd of December. This exhibition and fair comprises three classes; that is to say:—Wines exhibited for competition for prizes; wines for sale; and machines and other implements used for the cultivation of vines and for wine making. In the first class will be admitted only wines made by the exhibitor entirely is to say, in the districts of Alessandria, Acqui, Asti, Novi, and Tortonia. These wines will be from grapes grown exclusively in the province—that divided into three categories, namely, common table wines, choice table wines, and fine wines. The prizes assigned to these classes and categories consist of three gold and three silver medals, given by the Minister of Agriculture and Commerce; and twelve silver and twenty-four bronze medals, given by the Agricultural Committee of Alessandria (Comizio Agrario d'Alessandria). Besides these, three silver and three bronze medals will be distributed to the best wines of each district competing amongst themselves; and such a number of honourable mentions, as the commissioners may see fit to distribute. In the second class will be admitted any kind of Italian wine; these wines will be sold by public auction, private contract, or at fixed prices. The third class will consist of machines, instruments, utensils, tools, &c., employed in the cultivation of the vine and in wine making. Exhibitors and inventors of every country are invited to compete in this class, the prizes of which will consist of three silver and six bronze medals, and such a number of honourable mentions, as the commissioners may see fit to distribute. The "Prize of Honour" consists of a silver medal, and purse of eighty francs, given by the Marquis Balbi-Piovera for the best essay or memoir on wine-growing and making, considered with a view to fitting the wines grown in the province of Alessandria for exportation. Anyone desiring to take part in this exhibition and fair is requested to apply, during October, to the Agricultural Committee of Alessandria. The objects intended for exhibition will be received from the 1st to the 15th of November.

Colonies.

Agriculture in Victoria.—The old system of colonial farming, the growth of wheat, hay, oats, and potatoes, is fast giving way, and every year there is more stock kept on the cultivated lands. The great difficulty with most farmers has been the want of sheep-proof fences, as such things were not thought of in the early days, and when profits were diminishing the outlay could not well be incurred. Now, however, no others are put up, so that before long every holder of two or three hundred acres, or even less, will have his flock of sheep; and with the keeping of sheep the cultivation of English grasses extends, although there is still room for much advance in this direction. On only a few properties in the west district is the laying down of land to continue under grass for a period of years beginning to be part of a regular system, but it must become so generally, for in this way is the fertility of the land to be most easily preserved where high farming cannot be adopted.

Queensland Gold.—The gold fields in the north of the colony of Queensland are causing no little excitement, as rumours of enormous nuggets are constantly being wafted about. There can be no doubt that that portion of Queensland is rich in mineral wealth, and its resources could have been much more fully developed if really experienced miners had paid it a visit some time ago. Many professional diggers have been deterred from going to this part by some doubt about the presence of gold in paying quantities. The consequence is, that by far the majority of the men on these northern fields are inexperienced, and it will take some time before the full value of the ground is established.

The Pastoral Prospects of Queensland may be reported as particularly good. Throughout the winter, grass and water have been abundant, and an early and successful lambing season is looked forward to as a means of helping the pastoral settlers through many of their difficulties. A noticeable feature is the excessive numbers of fat cattle and sheep, for which it is difficult to find a market, as the neighbouring colonies, at the present time, are almost self-supporting in that respect. A good many sheep are finding their way across the borders. Boiling down is, however, much resorted to by stockholders. At Maryborough and on the Brisbane, something is being done in the way of preparing meat for exportation; but the general impression is that in future a fourth of the stock of the colony will have to be disposed of for the tallow.

Notes.

The Excavations at Pompeii.—An interesting report has been published by the Senator Fiorelli, superintendent of the Museum of Naples, and of the excavations at Pompeii, on the important archeological discoveries that have been made in Italy from 1846 to 1866. During this period, no fewer than 25,864 different objects have been found at Pompeii, amongst which the most numerous are 9,831 ancient coins, chiefly of bronze. Various articles of female jewellery in gold and precious stones have likewise been found; necklaces in gold and silver, surgical instruments, sun dials, arms, cymbals,

mirrors, lamps of metal, and tools of various trades. Amongst the natural products that have been found in a good state of preservation may be mentioned vegetables of every variety, olives, nuts, dried figs, grapes, apples, and peach stones. Some of the grains of corn that had been buried for ages were sown, and have produced fresh ears of corn, which has been even ground, and the flour made into bread. In this necropolis 27 human skeletons have been disinterred; plaster casts have been taken from some of them. The remains of two horses, eleven fowls, eight dogs and several turtles have likewise been dug out.

Progress of the Mont Cenis Tunnel.—The Italian government have published the usual monthly statement of the progress made in the Mont Cenis Tunnel. According to this the length of the boring up to the 1st September was 7,403·52 mètres, to the 1st October, 7532·25 mètres; showing a progress of 128·73 mètres during the month of September, and as the total length of the tunnel is 12,220 mètres, only 4,687·75 mètres, or about one-third, remains to be finished.

Beethoven's Piano.—An interesting souvenir of the celebrated composer, Beethoven, is at present in the possession of an inhabitant of the town of Klausenberg, in Transylvania. This instrument, which must have been made more than seventy years ago, is in a good condition; and on one of the panels is painted a portrait of the great musician when twenty years of age. This piano is said to be the one that was presented to him by the maker, Voggel, of Pesth.

Patents.

From Commissioners of Patents' Journal, October 18th.

Grants of Provisional Protection.

Animal matters, utilising refuse—2822—J. H. Brown.
Anvils—2578—W. E. Newton.
Batteries, floating, propelling and manœuvring—2743—J. Elder.
Bedsteads and mattresses—2766—T. E. Clarke.
Billiard and dining table combined—2762—G. F. Green.
Blacking, metal-founders'—2505—F. H. and J. W. H. Pattison.
Boilers—2777—C. Mace.
Boilers, &c.—2780—W. Spence.
Boots and shoes—2735—C. Mole.
Boots and shoes—2779—W. R. Lake.
Boots and shoes—2805—W. Low and J. Treadwell.
Braid, machinery for manufacturing—2799—J. H. Johnson.
Buildings, arches, &c., construction of—2729—S. Parr and A. Strong.
Camphor, refining—2816—C. D. Abel.
Candles, &c.—2734—F. Meyer and W. Wainwright, jun.
Candles, &c.—2761—J. L. Field.
Cartridges—2550—G. Clark.
Castors—2765—R. Fletcher.
Chemical products, &c., manufacturing—2760—G. Allibon and A. Manbré.
Chimneys, &c.—2677—W. Cooke.
Chlorine, &c., obtaining—2801—J. Anderson.
Cigar and pipe lights—2459—H. J. Simlick.
Cotton, &c., used in dentistry, treating—2785—A. M. Clark.
Egg-boiling apparatus—2750—I. Dimock.
Fabrics, &c., treating mixed—2803—G. Martin.
Fans—2737—L. Laine.
Fire-arms, breech-loading, extracting cartridge cases from—2725—R. Adams.
Fire-lighters and artificial fuel—2820—H. Trotter.
Fruit, cleaning—2814—H. Faulder.
Fulling machines—2775—G. Ramsden, L. Webster, and J. Walker.
Furnaces—2781—R. Dick.
Furnaces, burning oil in—2752—J. Donald.
Furnaces, &c.—2756—E. P. Alexander.
Furnaces, &c.—2757—T. Bird.
Furnaces, &c.—2772—C. Ritchie.
Furnaces, &c.—2782—H. D. Pochin and E. Hunt.
Gas burners—2811—N. F. Taylor.
Gas lamps and burners—2643—L. Lenzberg.
Grain, drying—2804—J. S. Williamson.
Grain, drying, &c.—2659—J. S. Williamson.
Hat blocking machine—2728—A. M. Clark.
Hats, &c.—2742—H. Killogg.
India-rubber tubing—2744—M. Hamer.
Iron, sheet—2768—R. H. Taunton.
Knives, &c., sharpening—2603—R. Canham.
Laboratory, portable—2784—W. E. Gedge.
Lamps—2741—E. Lever.
Leather, manufacturing articles of—2559—J. H. Brown.
Locomotive engines, &c.—2755—J. Clark.
Looms—2724—J. E. H. Andrew.
Looms—2727—F. Frew and J. Speirs.
Looms—2754—C. Honegger.
Looms—2790—T. Sagar and T. Richmond.
Looms—2815—C. J. Galloway.
Match boxes—2764—W. E. Gedge.
Mattresses—2363—L. A. Bainée and M. J. Sibillat.
Mats, india-rubber—2783—G. P. Dodge.
Metal, moulding—2813—J. Smith.
Metal, &c., drilling, &c.—2732—F. Branscombe.
Metallic tubes, ornamental—2749—T. Weston.
Mowing and reaping machines—2763—W. Mitchell.
Mules for spinning, &c.—2747—B. Dobson and R. Halliwell.
Nails—2733—J. and J. A. Huggett.
Nails—2769—F. Parkes.
Nails and spikes—2788—G. Mellor.
Needles, machine—2787—G. Townsend.
Omnibuses, &c., registering apparatus for—2821—T. Ollis.
Packing, lubricating—2746—T. Silver.
Paraffin, &c., treating—2731—L. de la Peyrouse.
Pipes and cigar tubes—2817—R. P. Faucheux.
Pneumatic springs—2810—J. Piddington.
Potatoes, preserving—2753—J. Dewar.
Pumps—2809—L. Williams.
Railway carriages, &c., ventilating—2078—A. B. Ibbotson.
Railway carriages, &c.—2796—J. Offord.
Railway fastenings—2771—C. J. Appleby.
Railway points—2795—W. Smith.
Railway trains, transmitting signals in—2730—J. and F. S. Cocker.
Railway wheels—2739—J. H. Johnson.
Rollers for maps, blinds, &c.—2631—P. Porter.
Ropes, winding—2759—J. G. Jones.
Rules, jointed—2807—A. Bradburn and S. T. Marsh.
Sewing machines—2770—A. C. Henderson.
Sewing machines—2794—J. Gutmann.
Ships—2798—G. H. D. Mathias.
Ships' bottoms, cleaning whilst at sea—2748—C. P. Jones.
Signals—2691—P. H. Colomb and F. J. Bolton.
Skins, treating—2736—H. A. Bonneville.
Spinning machines, &c.—2767—W. and S. Smith.
Steel scrap, utilising Bessemer—2789—A. T. Becks.
Swimming apparatus—2793—A. Ford.
Tobacco—2699—A. Tod and J. Heatley.
Type, distributing—2800—R. Hattersley.
Typographic apparatus, form-fixing—2645—F. T. M. A. Guyon.
Urinals—2776—F. J. Jeffery.
Vehicles, registering passengers travelling in public—2740—G. R. Solomon, jun.
Watch chains, &c., securing—2751—W. James and W. Hill.
Wood, &c., articles of, ornamenting, cutting, creasing, and bending—2139—E. Tomlinson.
Zinc, manufacturing—2819—D. Swan, jun.

Inventions with Complete Specifications Filed.

Baths, medical electric—2835—A. Danilecki.
Gas burners—2859—J. Brönner.
Grain, decorticating—2872—H. A. Dufrené.
Smoke consumer—2871—J. B. P. A. Thierry.
Telegraphs—2879—W. R. Lake.

Patents Sealed.

1147. W. Kirrage.
1158. R. H. Frith.
1161. W. G. Crossley.
1163. J. W. Cochran.
1167. J. Needham.
1170. J. B. Mannix.
1171. C. T. and E. Hook.
1180. S. J. Mackie.
1204. H. Smith.
1205. E. G. Fitton and S. Dear.
1318. B. H. Smith.
1384. W. Bracewell, W. Pickup, and B. Lund.
1387. A. Cooper.
2004. J. J. Buckley and C. Hook.

From Commissioners of Patents' Journal, October 22nd.

Patents Sealed.

846. J. and A. Gamgee.
1073. R. Day.
1184. W. F. Wilkinson.
1189. J. D. Brickles.
1192. W. R. Lake.
1198. C. E. Brooman.
1212. E. Guenin.
1214. G. A. Huddart.
1231. C. E. Brooman.
1242. R. Smith and M. B. Westhead.
1254. A. M. Clark.
1261. F. Jossa.
1265. J. H. Johnson.
1266. J. H. Johnson.
1282. C. Dutton.
1292. A. M. Clark.
1329. T. Crow.
1429. A. V. Newton.
1469. A. V. Newton.
1514. A. V. Newton.
1547. A. M. Clark.
1550. T. Greenwood.
1600. T. Greenwood.
2379. W. E. Newton.

Patents on which the Stamp Duty of £50 has been Paid.

2538. R. Wright.
2559. A. Hill.
2570. J. Hart.
2604. F. Martin.
2678. A. and W. Smith.
2612. G. E. Donisthorpe.
2623. W. Richards.
2642. G. E. Donisthorpe.
2675. A. Parkes.
2585. T. Turner, jun.

Patents on which the Stamp Duty of £100 has been Paid.

2552. J. Thompson and E. G. and F. A. Fitton.
2525. W. Henderson and J. Down.
2561. W. Jamieson, W. Robinson, and C. Rowbottom.
2651. W. T. Vose.

Journal of the Society of Arts.

FRIDAY, NOVEMBER 1, 1867.

Announcements by the Council.

Artizans' Visits to Paris.

The following is the amount of subscriptions up to the present date :—

H.R.H. the Prince of Wales, President	£31	10	0		
Society of Arts	105	0	0	£520	16	0
Other Subscriptions already published	384	6	0		
The Worshipful Company of Drapers ..				10	10	0
Her Majesty's Government				500	0	0
Total..				£1,031	6	0

Subscriptions may be forwarded to the Financial Officer, Society's House.

Proceedings of the Society.

Memorial Tablets of Great Men and Events.

In order to show how rich the metropolis is in the memory of important personages and events, which it would be desirable to mark by means of tablets on houses, the Council have caused an alphabetical list to be prepared, the fourth part of which is now inserted. Other parts will follow. The Council request the assistance of members of the Society in completing and correcting this list, especially with reference to dates and the insertion of other names.

Whilst the Council intend proceeding with this work, they desire also to see it carried on by others—either by corporate bodies or individuals—and the Council will be happy to be instrumental in procuring suitable tablets from the manufacturers.

Goldsmith, Oliver (b. 1728—d. 1774), poet. He wrote "A Reverie" (Essay No. 4), at the "Boar's Head" Tavern, Eastcheap. He lodged from 1763-4 at the house of a Mrs. Elizabeth Hemming, in Canonbury-place, Islington. From 1758 to 1760 he lived at what was then No. 12, Green Arbour-court, Old Bailey, the right-hand corner as you ascend the steps from Fleet-market. He resided also in Wine Office-court, Fleet-street, and at No. 2, Brick-court, Middle Temple, "up two pair of stairs," where he died, April 4th, 1774. At the Royal College of Surgeons, Lincoln's Inn-fields, he was examined and rejected as unqualified for the inferior office of surgeon's mate. In Salisbury-court, Fleet-street, he sat for a short time as press corrector to Richardson. He was buried in the church-yard of the Temple, 9th April, 1774, at 5 o'clock in the evening. A monument is erected to his memory in Westminster Abbey.

Gondomar, Count (temp. James I.), lived in Ely-house, Holborn; also in No. —, Petticoat-lane, Whitechapel. He reported to King James that the trained bands were the finest soldiers and best armed in the kingdom.

Gordon, Lord George (b. 1750—d. 1793), the hero of the riots of 1780; lived at No. 2, Welbeck-street, Cavendish-square; was imprisoned in the Tower of London, and died in Newgate, the prison he and his rioters had broken open. He lies in the cemetery attached to St. James's Chapel, Hampstead.

Gough, Richard (b. 1735—d. 1809), the antiquary; born in No. —, Winchester-street, Austin Friars.

Gough, Sir John, Baronet (circ. 1728), lived at Gough-house, Chelsea.

Grafton, Henry Fitzroy, Duke of (b. 1663—d. 1690), lived in Arlington-house, now Buckingham-house.

Grafton, Charles, 2nd Duke of (b. 1683—d. 1757), lived in Bond-street (No. —), and it is probable that part of his house is now called the Clarendon Hotel. He was a member of the Kit-Kat Club.

Grant, Sir William (b. 1760—d. 1832), an eminent English lawyer, and Master of the Rolls; was considered a judge of great integrity; lived in No. 3, Lincoln's Inn New-square.

Grantham, Lord (temp. Geo. I.), lived in No. —, Albemarle-street, on the east side; was Chamberlain to the Princess of Wales.

Grattan, Henry, Right Hon. (b. 1750—d. 1820), the orator and statesman; died in No. —, Baker-street, Portman-square; buried in Westminster Abbey.

Gray, Lord (temp. Queen Anne), lived in the last house on the west side of Cecil-street, Strand.

Gray, Thomas (b. 1716—d. 1771), poet, and a man of profound learning. He was born in a house on the site of 41, Cornhill; the original house being destroyed by fire, Gray immediately rebuilt it. He lodged, when in London, in Jermyn-street, St. James's, either at Robert's, the hosier, or Frisby's, the oilman. There is a monument to him in Westminster Abbey.

Green, Matthew (b. 1696—d. 1737), poet; author of "The Spleen," and other poems; died at No. —, Nag's Head-court, Gracechurch-street.

Grenville, Right Honourable Thos., founder of the famous Grenville Library, which he bequeathed to the British Museum; lived and formed his library at No. 4, Hamilton-place, Piccadilly.

Gresham, Sir Thos. (b. 1519—d. 1579), founder of the first Royal Exchange in London; also founded Gresham College and Gresham Almshouses. His house of business was at No. 68, Lombard-street, (now Messrs. Martin and Stone's, bankers); his sign was a grasshopper; a portrait of him hangs in the Mercers' Hall, Cheapside. He lies buried, and a monument stands to his memory, at St. Helen's Church, Bishopsgate-street.

Grignion, Charles (d. 1810), engraver; lived at 27, James's-street, Covent-garden.

Grimaldi, Joseph (b. 1779—d. 1837), the famous clown; obtained his greatest triumphs at Sadler's-wells; lived, in 1822, at No. 8, Exmouth-street, Spa-fields, Clerkenwell.

Guizot, Francois Pierre Guillaume (b. 1787), the French ambassador; lived at Manchester-house, Manchester-square.

Guthrie, William (b. 1708—d. 1770), author of "Guthrie's Grammar," and other works; died in Great Portland-street, Oxford-street, March 9th, 1770; buried in St. Marylebone cemetery, south side of Paddington-street, where against the east wall is a monument to his memory.

Guy, Thomas (b. 1644—d. 1724), a bookseller in Lombard-street (No.), built and endowed the hospital in Southwark which bears his name, also built three wards (on the north side of the outer court) of St. Thomas's Hospital, High-street, Southwark. Two monuments are erected to him in Guy's Hospital.

Gwynne, Nell (d. 1687), is said to have been born in the Coal-yard, Drury-lane; she also lived in Drury-

lane, afterwards in 1670 in Pall-mall, on "the east end, north side," next to Lady Mary Howard, and from 1671 to the time of her death on the south side, in a house on the site of the present Number 79, the office of the Society for the Propagation of the Gospel in Foreign Parts; she is said to have had a country-house in Bagnigge-wells, Coldbath-fields; a portrait of her hangs at the Garrick Club, and in the Privy-garden collection. Buried in St. Martin's-in-the-Fields.

Haines, Joe (d. 1701), comedian, died in No. —, Hart-street, Covent-garden, April 4th, 1701.

Hall, Edward (b. 1547), the chronicler, was a student in Gray's-inn.

Hall, John (b. 1739—d. 1797), engraver, lived in No. 83, Berwick-street, Soho, where he engraved Sir Joshua's portrait of R. Brindsley Sheridan. Buried at Paddington churchyard.

Hallam, Henry, historian, lived at 67, Wimpole-street, Cavendish-square, where he wrote his "History of the Middle Ages," and his "Constitutional History of England."

Halley, Edmund (b. 1656—d. 1741-2), astronomer, educated at St. Paul's school; lived in No. —, Prince's-street, Bridgewater-square, also in No. —, Winchester-street, Broad-street Ward, City; his father was a soap-boiler in this street. He lies buried in Westminster Abbey.

Hamilton, Wm. Gerard (b. 1727—d. 1796), (called Single-speech Hamilton), lived and died in Upper Brook-street, Grosvenor-square.

Hamilton, Sir Wm. (b. 1730—d. 1803), the collector of the Hamiltonian gems, and also known as the husband of Nelson's Lady Hamilton; lived and died in what was 23, Piccadilly; his collection was purchased by the British Museum.

Hamilton, Lady Emma (b. 1764—d. 1815), when Emma Lyon, lived as a nurserymaid at the house of a Dr. Budd, in Chatham-place, Blackfriars, also at No. 11, Clarges-street, Piccadilly (1804 to 1806); married at St. George's, Hanover-square.

Hampden, John (b. 1594—d. 1643), lived in Gray's-inn-lane, Holborn; here he and Pym held their consultations when the matter of ship-money was pleaded in the Star Chamber.

Handel, George Frederic (b. 1685—d. 1759), musician, lived at 57, south side of Brook-street, four doors from Bond-street, and two from the gateway, also for three years in Burlington-house, Piccadilly; used to perform "The Messiah" at the Foundling Hospital, of which latter place he was a great patron. He is buried, and a monument is erected to his memory, in Westminster Abbey.

Hanway, Jonas (b. 1712—d. 1786), the traveller, lived and died in a house in Red Lion-square. He was one of the chief originators of Magdalen Hospital, St. George's-fields, also of the Marine Society for fitting out beggar boys for the sea. He was the first man who ventured to carry an umbrella in the streets of London. After using one for 30 years, he saw them come into general use.

Harcourt, Vernon, Viscount (b. 1660—d. 1727), Lord Chancellor, lived at No. —, Arundel-street, Strand.

Harley, Edward, Second Earl of Oxford (d. 1741); founder of the Harleian Library; lived in Harley-street, Cavendish-square. Portraits of him hang in the apartments of the Society of Antiquaries and the British Museum.

Harley, Robert, Earl of Oxford (b. 1661—d. 1724); the friend of Pope and Swift, lived in Buckingham-street, Strand, in 1706; also in Dover-street, Piccadilly; also in York-buildings, Strand. Was stabbed by Guiscard in the Council-chamber of the Cock-pit at Whitehall. A portrait of him hangs in the British Museum.

Harlon, George Henry (b. 1787—d. 1819); artist, lived and died at 83, Dean-street, Soho. He is buried under the altar of St. James's Church, Piccadilly.

Harrington, James (b. 1611—d. 1677), author of the "Oceana;" lived in the Little Ambry ("a faire house on the left hand") which looks into the Dean's-yard, Westminster.

Harris, Joseph (temp. Charles II.); actor, lived in Salisbury-court, Fleet-street.

Harrowby, Dudley, Earl of (b. 1762—d. 1847), lived at 39, Grosvenor-square. It was in this house that Thistlewood and his associates plotted to murder his Majesty's ministers, on the 23rd February, 1820, as they sat at dinner.

Harvey, William (b. 1578—d. 1657), discoverer of the circulation of the blood; lived at Cockaine-house; was physician to St. Bartholomew's Hospital for 34 years. A portrait of him hangs at the College of Physicians.

Hatton, Sir Christopher (b. 1539-40—d. 1591); Queen Elizabeth's handsome Lord Chancellor; lived in Ely-place (Hatton-house), where he died. Was a member of the Inner Temple; here he danced, when Lord Chancellor, with the mace and seals of his office before him. Buried, and a monument to him in St. Paul's Cathedral.

Haward, Francis, engraver; lived in 1787 at 29, Marsh-street, near the turnpike (where the railway arch runs across the Westminster-road.)

Hawkesworth, John, LLD. (b. 1715-19—d. 1773); author of "The Adventurer," and friend of Johnson. He was originally a hired clerk in the office of one Harwood, an attorney, in Grocer's-alley, in the Poultry. Lived, in 1773, in Great Ormond-street, Bloomsbury. Died in Lime-street, Leadenhall-street.

Hayman, Francis, R.A. (b. 1708—d. 1776), painter; lived in Dean-street, Soho, in the house now divided into Nos. 42 and 43.

Hazlett, William (b. 1778—d. 1830), a distinguished writer in general literature. In Southampton Coffee-house he laid the scene of his "Essay on Coffee-house Politicians." He lived in 19, York-street, Westminster; also in Frith-street, Soho, where he died. He is buried, and a monument is erected to him, at St. Anne's Churchyard, Soho.

Head, Richard (b. 1678), author of the "English Rogue," &c.; was a bookseller in Queen's Head-alley, Paternoster-row.

Heber, Richard (d. 1773—d. 1833), lived in James-street, Buckingham-gate; also in Pimlico, in a small, gloomy house within the gates of Elliott's brewery, between Brewer-street, Pimlico, and York-street, Westminster; here he died. In both houses, as well as at his country seat, Hoderet, and at Paris, he kept large portions of his extensive and noble library.

Henchman, Humphrey (b. 1675), Bishop of London; lived and died in London-house, Aldersgate-street (as Peter-house was then called).

Henderson, Alexander, Scotch Church Commissioner; lodged in a house near London Stone, in the heart of the City, in St. Anthony's, close to the church of that name.

Henderson, John (b. 1747—d. 1787); actor; born in Goldsmith's-street, Cheapside,; lived and died in a house in Buckingham-street, Strand. A portrait of him hangs at the Garrick Club. He is said to have made his first essay in acting in a large room on the first-floor of the "Old Parr's Head," Islington.

Henrietta, Maria, Queen of Chas. I., lived in Somerset-house.

Henslowe, Philip (temp. Elizabeth and James I.), owner of the Rose Playhouse; stage manager and master of the bears to Queen Elizabeth, and manager of the Paris Eaden Theatre; was originally a dyer on the Bankside, over against the Clink; buried in St. Saviour's, Southwark.

Herbert of Cherbury, Edward, Lord (b. 1581—d. 1648), lived in the reign of James I., "in a house among gardens near the Old Exchange;" buried in St. Giles-in-the-Fields.

Herbert, Sir Henry (d. 1673), last Master of the Revels

brother of Lord Herbert of Cherbury; lived in Lincoln-house, Tothill-street, Westminster; here he established the office of the Revels; lived and died in James-street, Covent-garden, "on the west side, in the red brick house, the last but one before the street abuts on Hart-street." His office book as Master of the Revels throws great light on the history of the stage at the time of Charles I. Buried in St. Paul's, Covent-garden.

Herbert, William (b. 1719—d. 1795), typographicist; was a printseller on the old London Bridge at the time the houses were taken down.

Hertford, Francis Charles, Marquis of (b. 1777—d. 1842), the favourite of the Prince of Wales, afterwards George IV.; lived at 13, Berkely-square; also in Manchester-house, Manchester-square, and in St. Dunstan's-villa, Regent's-park. He died in Dorchester-house, Park-lane.

Hertford, Charlotte, Countess of (of Thompson's "Spring"), lived in Lower Grosvenor-street.

Hervey, John, ancestor of the Bristol family; lived in No. 6, St. James's-square, now Bristol-house.

Hervey, Lady (Molly Lepel), lived in St. James's-place, St. James's-square, in a house with five windows in a row, fronting the Green-park.

Hewer, William, Pepys' friend, lived in (No. —?) Buckingham-street, Strand.

Hickes, Dr. (b. 1642—d. 1715), author of the "Thesaurus;" Vicar of All Hallow's, Barking, between the years 1680 and 1686. He lived in Great Ormond-street, Red Lion-fields, Bloomsbury, and is buried at St. Margaret's, Westminster.

Hill, Aaron (b. 1684-5—d. 1749-50); was born in a house on the site of Beaufort-buildings, Strand, and lived in Petty-terrace, Westminster, now York-street.

Hill, Rowland, Lord (b. 1772—d. 1842), the hero of Almarez, lived in the villa at the south-west corner of Belgrave-square, and also in a house pleasantly situated in the fields at Paddington.

Hill, Thomas (d. 1840), the patron of Bloomfield, originally a drysalter. He was the "Hull" of W. Booth's novel, and the supposed original of Paul Pry. He lived for many years, and died, in the second story of No. 2, James-street, Adelphi.

Hilliard, Nicholas (b. 1547—d. 1619), miniature painter to Queen Elizabeth, whose portrait he took several times. Buried at St. Martin's-in-the-Fields.

Hoadley, Dr. Benjamin (b. 1705—d. 1757), physician, and son of Bishop Hoadley, author of "The Suspicious Husband;" lived in a house in Chelsea, adjoining Cremorne-house.

Hoadley, Benjamin, Bishop of Winchester (b. 1676—d. 1761), celebrated for his sermons on the inveterate errors of the clergy, which produced the celebrated Bangorian controversy. He died in the bishop's palace in Cheyne-walk, Chelsea.

Hobbes, Thomas, of Malmesbury (b. 1588—d. 1679), a writer and poet. He lived in a house in Fetter-lane, Holborn. Two portraits of him hang at the Royal Society.

Hogarth, William (b. 1697—d. 1764), painter, born in the parish of St. Martin, Ludgate, baptised at St. Bartholomew-the-Great, West Smithfield. He was apprenticed to Ellis Gamble, the goldsmith, at the "Golden Angel," in Cranbourne-alley, to learn the art of silver-plate engraving. Was a member of the Artists' Club, which held its meetings at the "Bull's Head," Clare-market. Married on the 23rd March, 1720, to Jane Thornhill, at the parish church of Paddington. He lived in 1733 to 1756 at (No.—?), Leicester-square. His father kept a school in Ship-court, three doors from Newgate-street, on the west side.

Hogg, James (b. 1772—d. 1835), the Ettrick Shepherd; lodged, during his only visit to London, in 1831, on the second floor of No. 11, Waterloo-place, Pall-mall, looking into Charles-street.

Holbein, Hans (b. 1497—d. 1554), painter; lived in Sir Thomas More's house, in Chelsea, for three years; is supposed to have been buried in St. Catherine Cree, or Christ Church, Leadenhall-street.

Holland, Lord (temp. Charles II.), lived in Charles-street, St. James's-square, also in Newport-street, Long-acre.

Hollar, Wenceslaus (b. 1607—d. 1677), an engraver of views and portraits; lodged at the Arundel-house, Strand, also close to Clement's-inn, Strand. He died in Gardeners'-lane, Westminster, between King-street, and Duke-street, and was buried in St. Margaret's, Westminster.

Holles, Denzill, Lord (d. 1679), patriot and statesman; lived, in 1664, in the Piazza, Covent-garden, under the name of Colonel Holles, and, in 1666, in a house on the site of Evans's Hotel.

Holt, Sir John (b. 1642—d. 1709), Lord Chief-Justice, died at Bedford-row, then called Bedford-walk.

Hood, Samuel (b. 1754—d. 1816), first Viscount, Admiral; lived in No. 12, Wimpole-street.

Hood, Thomas (b. 1791—d. 1845), the celebrated poet and wit; born at No. 31, Poultry, where his father had a bookseller's shop; buried in Kensall-green Cemetery, Harrow-road.

Hook, Theodore (b. 1788—d. 1841), novelist; was born in No. 3, Charlotte-street, Bloomsbury (now Bloomsbury-street). No. 54, Berner's-street, was the scene of his famous "Berner's-street Hoax." This consisted in sending about two hundred orders to different of tradesmen to deliver almost every description of goods to a Mrs. Tottenham, at the same house.

Hoole, John (b. 1727—d. 1803), a poet and translator of considerable reputation; lived in Hudson's-house, in Great Queen-street, Lincoln's-inn-fields; was a clerk in the East India-house.

Hoppner, John, R.A. (b. 1759—d. 1810), portrait painter, and rival of Lawrence; died at No. 18, Charles-street, St. James's-square, and lies buried in the cemetery of St. James's chapel, Hampstead.

Houblon, Sir John (d. 1711), first Governor of the Bank of England; his house and garden occupied the site of the present Bank-buildings.

Howard of Effingham, Charles Lord (b. 1536—d. 1624), was the Lord Admiral against the Spanish Armada in Queen Elizabeth's reign; lived in King-street, Westminster,

Howard, John (b. 1726—d. 1790), the philanthropist. Was born at Hackney; his father was an upholsterer, in Long-lane, West Smithfield. He was apprenticed to a wholesale grocer in Watling-street; lived in lodgings kept by Mrs. S. Lardeau, in Stoke Newington. A monument is erected to him in St. Paul's Cathedral.

Howard, Sir Philip (temp. Charles II.), commanded the "Queen's Troop." Lived in (No.—?) Suffolk-street, Haymarket.

Howe, John (b. 1630—d. 1705), the Nonconformist, lies buried in Allhallows', Bread-street.

Howe, Richard (b. 1725—d. 1799), the Admiral who defeated the French off Ushant; was also First Lord of the Admiralty; lived and died in No. 11, Grafton-street, Bond-street. A monument is erected to him in St. Paul's Cathedral.

Howell, James (d. 1666), a political and historical writer; was confined in the Fleet Prison. He lies buried in the Temple.

Hoyle, Edmund (b. 1672—d. 1767); author of a treatise on whist and quadrille; died in Welbeck-street, Cavendish-square; and lies buried in the cemetery in Paddington-street.

Hudson, George, the Railway King, purchased the lofty house on the east side of Albert-gate.

Hudson, Thomas (b. 1701—d. 1779), painter. He had Sir J. Reynolds for a pupil. He lived at Nos. 55 and 56, Great Queen-street, Lincoln's-inn-fields, then one house.

Hume, David (b. 1711—d. 1776), the celebrated his-

torian and philosopher; was a member of Brookes's Club, St. James's-street.

Hungerford, Sir Edward (temp. Charles II.), lived in Spring-gardens, after his removal from the house on the site of Hungerford-market.

Hunsdon, Henry Carey, Lord (b. 1524—d. 1596). He was Queen Elizabeth's cousin, and Lord Chamberlain; lived in the chief house in the Friary, Blackfriars; also in Somerset-house.

Hunt, Leigh (b. 1784), was educated at Christ's Hospital, and had the rank of Deputy Grecian; was confined for two years in Horsemonger-lane Gaol, for a libel against the Prince Regent in 1812-14.

Hunter, John (b. 1728—d. 1793), an eminent surgeon; presented his anatomical collection to the Royal College of Surgeons; it is still called the Hunterian collection. He lived, and had his museum in Leicester-square, one of the houses about the middle, on the eastern side. He died suddenly in St. George's Hospital, and is buried in St. Martin's-in-the-Fields. A portrait of him, by Sir Joshua Reynolds, hangs in the Royal College of Surgeons.

Huskisson, William, M.P. (b. 1770—d. 1830), statesman; killed at the opening of the Manchester and Liverpool Railway. A statue is erected to him at Lloyd's.

Hyde, Edward, Earl of Clarendon (b. 1608—d. 1774), Chancellor, and author of "The History of the Rebellion in the time of Charles I.;" called the great Lord Chancellor of human nature; lived in Berkshire-house, St. James's, for a short time after the fire; also in Worcester-house, Strand, and in Clarendon-house, Piccadilly, which he built for himself; was a member of the Middle Temple. He was married at St. Margaret's, Westminster, to Francis Aylesbury, the grandmother of Queen Mary and Queen Ann. He died in banishment, and is buried in Westminster Abbey.

Hyde, Henry, Lord Clarendon (d. 1709), Lord Cornbury afterwards; lived in Clarendon-house, Piccadilly, and in St. James's-square.

Hyde, Lawrence, Earl of Rochester (d. 1711), second son of the great Lord Clarendon. Stated that Clarendon-house, built by his father, was the cause of his fall, owing to the envy it drew upon him. Lived in St. James's-square.

Inchbald, Elizabeth (b. 1756—d. 1821), a celebrated actress, and authoress, amongst other works, of "A Simple Story." She lived in one room on the second floor at (No. —?) Frith-street, Soho; she died at the Roman Catholic boarding establishment, Kensington-house, Kensington. Her portrait hangs at the Garrick Club.

Incledon, Charles (b. 1756—d. 1826), a celebrated vocalist; one of the best singers of English national songs. He died at No. 13, Brompton-crescent.

Jackson, John, R.A. (b. 1778—d. 1831), painter; buried in the cemetery of St. John's-wood Chapel.

Jacob, Lady (temp. James I.), wife of Christopher Brooke, the poet; lived in (No. —?) Drury-lane.

Jacobson, Theodore (d. 1772), architect; designed the Foundling Hospital. He is buried in All-Hallows-the-Great Church.

Jaggard, John (temp. James I.), the printer; lived in (No. —?) Fleet-street.

Jansen, Cornelius (b. 1590—d. 1665), the painter; lived in Blackfriars, and had a good deal of business.

Jansen, Sir Theodore (temp. George I.), was a director of the South Sea Bubble; his property in Queen-square, Westminster, was seized in consequence. He was one of the first inhabitants of Hanover-square.

Jarman, Edward (d. 1666), architect and City surveyor; built the present Drapers' Hall, the second Royal Exchange, the Fishmongers' Hall, and the Merchant Taylors' Hall.

Jefferies, George (d. 1689), Lord Baron Wern, commonly called Judge Jefferies. He lived in a large brick house north of Storey's-gate, St. James's-park; was captured at Wapping when trying to escape from London after the death of King James. He was imprisoned in the Tower, and lies buried in St. Mary's, Aldermanbury.

Jenner, Edward, M.D. (b. 1749—d. 1823), the discoverer of vaccine inoculation; lived at No. 14, Hertford-street, Mayfair.

Jermyn, Henry, Lord Dover (d. 1708); lived in Dover-street, Piccadilly, and in Piccadilly.

Jervas, Charles (b. 1675—d. 1739), a painter and writer. He is immortalised by Pope's friendship and panegyric. He lived in Cleveland-court, St. James's.

John, King of France (d. 1364), imprisoned in the Savoy, and also in the Tower of London. He died while on a visit to this country, shortly after his release, in his former prison, the Savoy.

John of Gaunt (d. 1399); he died in Ely-place, Holborn. A stately tomb stood to his memory in old St. Paul's.

Johnson, Gerard, the sculptor, who made the monumental bust and tomb of Shakespeare at Stratford-upon-Avon. He was a Hollander, and lived in the parish of St. Thomas-the-Apostle.

Johnson, Dr. Samuel (b. 1709—d. 1784). His first London lodgings were in (No.—?), Exeter-street, Strand, at a staymaker's, named Norris. In 1737 he lived in (No.—?), Woodstock-street, Hanover-square; in 1748 at the "Golden Anchor," Holborn-bars; in 1760-65 at (No.—?), Inner Temple-lane, Fleet-street; in 1760 at (No.—?), Johnson's-court, Fleet-street; also at the corner house on the west side of Bow-street, Covent-garden, formerly Will's coffeehouse; at No. 6, Castle-street, Oxford-market; and, finally, from 1777 to his death, at No. 8, Bolt-court, Fleet-street, on the right-hand side. He made a speech on the subject of mechanics in the great room of the Society of Arts. At No. 40, Essex-street, Strand, he established an evening club in 1783, occasionally called Sam's. At the "Turk's Head," in Gerard-street, he and Sir J. Reynolds established the Literary Club, in 1764. It was first called "The Club." He was also a member of a club held at the "King's Head," Ivy-lane, Newgate-street. He attended St. Clement Danes, Strand. His pew is still pointed out. Occasionally supped at the "Crown and Anchor" Tavern, in the Strand, now the Whittington Club, and here he quarrelled with Percy about old Dr. Mounsey. Compiled a great part of his dictionary in No. 17, Gough-square, Fleet-street, in the garret of the house in the north-west corner. The "Mitre" Tavern, Mitre-court, Fleet-street, was a sort of rendezvous for him and his friends. There he drank his bottle of port and kept late hours. Sat for his bust to Nollekens, the sculptor, at No. 9, Mortimer-street, Cavendish-square. A portrait of him hangs in the Privy-garden collection, by Sir J. Reynolds. He lies buried in Westminster Abbey, and a monument is erected to him in St. Paul's Cathedral.

Jones, Inigo (b. 1573—d. 1652), baptized at St. Bartholomew-the-Less, Farringdon-without. He buried his money in Lambeth-marsh during the great civil war. Erected a monument to his friend G. Chapman, the translator of Homer, in St. Giles-in-the-Fields, which is still standing. Lived in Scotland-yard, Whitehall, and died in Somerset-house. Was buried in St. Bennet, Paul's-wharf. He designed and built the following places:—Thanet-house, Aldersgate-street; Ashburnham-house, Little Dean's-yard; Barber Surgeon's Hall, Monkwell-street, City; the gateway to Beaufort-house, Chelsea, removed to Chiswick, where it now stands; the water gate at the bottom of Buckingham-street, Strand; the stone gateway now in the grounds of Holland-house; Lincoln's-inn Chapel; part of Lincoln's-inn-fields; Lindsay-house, Lincoln's-inn-fields; the portico to old St. Paul's; St. Paul's, Covent-garden; the Piazza, Covent-garden; the Banqueting-house, Whitehall, and some consider of St. Alban's, Wood-street; Bedford-house, Bloomsbury; St. Catherine Cree, or Christ Church, Aldgate.

Jones, Sir William (b. 1746—d. 1797), a Judge of the Supreme Court in Bengal; a poet and Oriental scholar. Lived in South Audley-street, Grosvenor-square (house opposite Audley-square), and also had chambers in Lamb's-buildings, Temple. A statue has been erected to him in St. Paul's Cathedral.

Jones, ——, a clock-maker; the first barometer seller in London; had a shop in Inner Temple-lane, Fleet-st.

Jonson, Ben (b. 1574—d. 1639), poet. Educated at Westminster School. Lived in Blackfriars in 1607; also in Hartshorne-lane, near Charing-cross. He is buried, and a monument is erected to his memory, in Westminster Abbey. His "Bartholomew Fair" was first acted at the Hope Theatre, Bankside, Southwark. When young he served as a bricklayer, and assisted in building Lincoln's Inn.

Jordan, Dorothy (b. 1762—d. 1816), actress; lived at 3, now 30, Cadogan-place, Sloane-street, third door from Pont-street.

Kean, Edmund (b. 1787—d. 1838), tragedian. Lived at No. 12, Clarges-street, Piccadilly, from 1816—24.

Keats, John (b. 1796—d. 1821), poet; was born at the "Swan and Hoop" livery stables, No. 28, on the Pavement in Moorfields; lived at "Queen's Arms Tavern," No. 71, Cheapside.

Keith, George, Viscount (b. 1746—d. 1823), the Admiral who captured the Cape of Good Hope from the Dutch in 1795; lived in No. 45, Harley-street, Cavendish-square.

Kemble, John Philip (b. 1757—d. 1823), a celebrated actor. He suggested the building of Dulwich Picture Gallery. He lived at 89, Great Russell-street, Bloomsbury, a house which was pulled down to make way for the eastern wing of the British Museum. A portrait of him hangs at the Garrick Club, and there is a statue of him in Westminster Abbey.

Kenneth, White (b. 1660—d. 1778), Bishop of Peterborough; author of "Kenneth's Register," &c., lived and died in St. James's-place, St. James's-square.

Kent, William (b. 1684—d. 1748), architect; built the Earl of Yarborough's house, in Arlington-square, Piccadilly, also Devonshire-house, Piccadilly.

Kenyon-Lloyd, Lord (b. 1733—d. 1802), Lord Chief-Justice; lived at No. 35, Lincoln's-inn-fields.

Killigrew, Thomas (b. 1611—d. 1682), poet and wit; lived in the north-west angle of the Piazza, Covent-garden, from 1637 to 1643. He lies buried in Westminster Abbey.

Kilmarnock, William Boyd, Earl of (b. 1702—1746), one of the rebel lords of 1745; lived in Rathbone-place, Oxford-street; tried at Westminster-hall, imprisoned in the Tower, and executed on Tower-hill, and is buried in the church of St. Peter's *ad vincula*.

Kip, John (d. 1722), the engraver of so many old palaces and seats in England; lived and died in a place called Long-ditch, Westminster.

Kitchiner, Dr. William, a physician and author; his "Cook's Oracle" had an enormous circulation; lived and died at (No. —?) Warren-street, Fitzroy-square.

Kneller, Sir Godfrey b. 1648—1726) an eminent painter; lived in the Piazza, Covent-garden, in a house near the recess leading into Covent-garden Theatre, also in Great Queen-street, Lincoln's-inn-fields, in a house next to Dr. Radcliff's. A monument is erected to him in Westminster Abbey.

Knight, Mrs., singer to Charles II.; lived at the south side, west end of Pall-mall, in 1671.

Knox, Vicesimus (b. 1752—1821), a learned divine and essayist, was educated as Merchant Taylors', and afterwards curate of St. Dunstan's-in-the-East.

Kynaston, Edward (d. 1712), the actor of female characters; lived at (No. — ?) Bedford-street, Strand; buried at St. Paul's, Covent-garden.

Kynaston, Sir Francis, the poet, lived in Covent-garden in 1636 "on the east side of the street, towards Berrie," and in 1637, on the west side of Bedford-street, Strand.

Proceedings of Institutions.

Birkbeck Institution (late London Mechanics' Institution).—The prizes and certificates obtained at the last Examinations of the Society of Arts and of the Metropolitan Association, together with the Institution prizes, were presented to the successful competitors on Tuesday evening, October 29th. Earl Russell presided, and distributed the awards to the male competitors, the female candidates receiving theirs from the hands of the Countess Russell, including the Princess of Wales' prize of the Metropolitan Association. The taker of the highest prize offered by the Birkbeck Institution (including the lady's scholarship) to ladies was Miss Styles, who also took other honours; and one young lady—Miss Hudson—took two prizes for excellence in book-keeping. The Hon. Geo. Denman M.P., moved, and Alderman Cotton seconded:—"That the thanks of this meeting be given to the Society of Arts for the earnest and successful manner in which it has encouraged arts, manufactures, and commerce throughout its long existence, especially for the valuable aid which it has given, by means of its excellent system of examinations, to the improvement and the extension of evening education. That the thanks of this meeting be also given to the Metropolitan Association for the great work which it has already effected in the promotion of the education of adults, and for the many encouragements it offers to students." Mr. W. G. Larkins, secretary of the Metropolitan Association, and visiting officer of the Society of Arts, responded, and called attention to the enlargement of the Programme of Examinations for next year, and the increase in the number and value of the prizes. Earl Russell delivered an address on the benefits of education; and other speeches were made, including addresses from Mr. Hughes, M.P., Serjeant Parry, Dr. Morrell, Professor Hughes, Professor Huxley, the Hon. Dudley Campbell, Mr. G. M. Norris, and Mr. W. L. Birkbeck.

Union of Lancashire and Cheshire Institutes.—The report presented at the annual meeting, held on the 12th October, says that the results of the past year's operations were in the highest measure satisfactory, both because of their intrinsic value and because of the illustration and enforcement they lent to the theoretic basis upon which the union is founded, and to the practical procedure by which its principles had been sought to be realised. At present there are 121 institutes in union, of which twelve have been admitted during the last year. The following is a summary from 84 institutes:—Number of members, 23,784; female members, 4,157; members attending elementary evening classes (last winter), 8,060; attending government science classes, 1,941; volumes in library, 137,121; income (66 institutes), £14,084. The following are fundamental qualities of the union:—Systematic class instruction, graduated examination scheme, periodic visitation, and a comprehensive prize scheme. By constant regard to class-work, the condition of which had been with them the test of the condition of the institute itself, the council had obtained real success in carrying forward elementary instruction—which, in all respects, was their first anxiety. In this department (class instruction) the labours of the visiting agent (Mr. Lawton) had proved of the greatest possible service. The reliance of the council on the notion of a graduated scheme of examination has been justified by results. By it they had been enabled to ascertain to a considerable extent the actual state of the mental faculties of the students, their relative condition of growth, with their especial features of strength and weakness. Upon the subject of elementary examination the council accept as a truth, both of principle and experience, that a substantial approximation to universality in elementary instruction is a fundamental and indispensable condition of higher education and true progress. At the elementary examination held in February last,

477 certificates were granted—130 of the higher grade, 347 of the lower—as against 373 certificates in the year preceding, and 171 in 1865. Of these, the highest number for any one place this year, namely, 47, were obtained by Droylsden, and the next highest number, 22, by the Mechanics' Institution at Burnley. Of certificates of the higher grade, the two most successful institutions were Macclesfield Useful Knowledge Society, 13, and Oldham Lyceum, 12. The final examination of the Society of Arts was held in April last. Candidates were sent in by 40 institutes, of which 31 are in direct connection with the Society of Arts. Nine institutes sent in candidates for the first time, 379 certificates were obtained by the union, against 272 in 1866, 281 in 1865, and 247 in 1864. Of these certificates 77 were awarded to students belonging to the Manchester Mechanics' Institution, 44 to the Salford Working Men's College, 30 to the Oldham Lyceum and Science School, and 22 to the Liverpool Institute. At 35 institutes science classes in connection with the Department of Science and Art have been in operation during the year. At the examination in May last 1,014 certificates were granted, against 633 in 1866, 786 in 1865, and 518 in 1864. Here again the Manchester Mechanics' Institution and the Oldham Science School stood well, having gained 156 and 115 certificates respectively. Bolton was the next highest centre of honour, 52 students from the Mechanics' Institution and 69 from the School of Science in that town having gained certificates. The council, by instituting examinations in special subjects, and providing prizes in connection with them, had in view the higher education of those who should have secured for themselves a systematic and progressive training in the elementary stages of instruction. The subjects of the special examination are, in general, such as relate to the scientific principles of the art of production, or to the phenomena involved in the relations of capital, skill, and industry. In the matter of technical education, the supporters of the union might look back upon the work of the last three years with great satisfaction. The council had earnestly endeavoured to put the Government provision for scientific instruction to the highest use. They have organised science classes upon a systematic plan, so as to concentrate and apply with the greatest economy and effect all the available teaching power. Of 6,552 students in the Government science classes for 1866-7, 1,930 belonged to Lancashire, and 229 to Cheshire. Nearly one-third of the entire number, 1,712, attended evening science classes in the Lancashire institutes of the union. At the May examination 1,065 "results" were obtained by Lancashire candidates, of which number 600 were artisans, excluding clerks and bookkeepers. The council express their strong conviction that any system of technical education adequate to the demands of the time, and the needs of the nation on the one hand must secure for the artisan-student a theoretic knowledge both of the nature and qualities of the raw materials upon which he operates, and of the means and methods of its transmutation into objects and forms of use and beauty; and on the other must give him the opportunity of becoming thoroughly master of the entire body of rules by which the practical results of the theoretic knowledge in both its departments are most conveniently and compendiously expressed. The council, after remarking upon the importance of female education, call attention to the special provision for the purpose furnished by the Society of Arts. In April last thirteen females presented themselves for examination, and obtained certificates. It is hoped that the example of their success will encourage others. The council referred with regret to the deaths of three of the vice-presidents of the union—the late Mr. J. A. Turner, Mr. James Shanks, and Mr. Edmund Buckley. The balance-sheet of the year's accounts showed that the receipts during the past twelve months were £431 19s. 2d., and that there is a small balance in hand.—The visiting agent (Mr. Lawton reported that he had inspected the elementary evening classes of 60 institutes, conferred with officers and committees of 36 institutes, and had delivered 38 lectures. There had been a steady increase in the number of classes for special instruction in science. He urged upon committees the great importance of establishing a science class for females, especially on the subject of animal physiology. It was gratifying to notice that, whilst in May there was not one female candidate in Lancashire and Cheshire, and at the November examination for teacher certificates there were only two, yet at the April examination of the Society of Arts, 13 female candidates obtained certificates. Some of the institutes in particular districts had suffered severely on account of the members having to work overtime.

CULTIVATION OF SILK.—THE *BOMBYX CYNTHIA.*

The following extracts from a correspondence between Mr. Le Neve Foster, the Secretary, and Mr. Harry Chester, a Vice-President, of the Society of Arts, may be interesting not only to our correspondents in the Bahamas, but to the readers of the *Journal* in other places:—

Extract from a Letter to the Secretary from Mr. Harry Chester, dated the 14th October, 1867.

"Some of my friends at Nassau, Bahamas, among whom are the Governor and the wife of the Bishop of Nassau, have requested me to see what can be done in London to help them in a project, which the principal inhabitants of the Bahamas have formed, 'to develope the resources of the colony," and particularly to introduce there the cultivation of silk. They conceive that, as the castor-oil plant, *Ricinus communis*, grows there as an abundant weed, the best silkworm they could introduce would be the *Bombyx ricini*, or *Bombyx cynthia*, which is known in Assam as the *Eria;* and I am asked whether we can give them any information on this subject, and assist them in procuring the worm."

Extract from a Letter to Mr. Harry Chester from Mr. Le Neve Foster, dated the 16th October, 1867.

"In the Society's *Journals* of the 24th February, 3rd March, 14th July, and 10th November, 1854, and in those of the 10th August, 1855, 5th February and 4th June, 1858, and 9th September, 1859, all of which I will forward to Nassau, a good deal of information is given respecting the so-called silkworm, which feeds on the leaves of the *Ricinus communis*. I am afraid that our friends in the Bahamas may be disappointed of their hopes of a favourable result in this direction. The product of the worm is not silk of the same quality or character as that of the *Bombyx mori*, or mulberry worm, and can never take the place of the latter, and will not compete in the market with it. The former material may be useful for certain purposes, and in certain climates. There are no markets for the article; they would have to be created if it is to exist at all as an article of commerce. From the nature of the cocoon, the so-called silk is not suited for reeling; the cocoons must be carded and spun into thread before it is woven. The fabric produced is rough and without lustre. A material very similar, I might almost say identical, is used in India, and is sometimes sold in our shops here under the title of Tusser or Tussah cloth. It is a good and useful material, of no beauty, but well adapted for clothing next the skin in hot countries.

"I may add, that the difficulty which necessitates a treatment of the cocoon of this worm different from that applied to the cocoon of the mulberry worm is a natural one. The cocoon of the mulberry worm is alike all over, and the thread, when reeled, runs off, from the beginning to the end, of an even quality, and the moth is killed before he makes his exit, otherwise he would destroy the cocoon. In the case of the castor worm the

cocoon is spun with a hole left for the exit of the moth, which escapes without injuring the cocoon, but in forming this exit hole the thread, whenever it approaches it, is of a rough and weak character like the rough and fuzzy stuff which envelopes the ordinary cocoons. Hence, the thread is not only apt to break whenever it comes near this exit, but it is of a rough and uneven character; and even if by great care it is reeled, as has no doubt been done, the thread is of little value owing to the above defects. Hence it is found best to card and spin a thread as from so much cotton wool."

Extract from letter to Mr. Foster from Mr. Harry Chester, dated the 24th October, 1867.

"Having read not only your letters but the *Journals* to which you referred me, I confess that there is a good deal of discouragement in the various reports. At Malta, where Sir William Reid, when Governor, took the greatest pains, with the greatest intelligence, to establish this manufacture, it appears to have entirely failed; and I understand you to say that you know, on trustworthy information, that it is a confessed failure. The German anticipations of success were certainly magnificent, but it does not appear that they ever reached beyond the stage of anticipation. Do you know anything of the results of the experiment made in Grenada, or at Turin, or elsewhere in Italy?"

Extract of Letter to Mr. Harry Chester from Mr. Foster, dated the 25th October, 1867.

"I have no particular information of the failure of *Bombyx ricini* in Italy or Grenada; but the absence of any information of success is almost as significant. People will seldom take the trouble to record their failures, though sometimes they are ready enough to relate their successes, even before they have been secured. The non appearance of the material in our markets is, moreover, I fear, a sufficient indication that it has not been produced, at least in marketable quantities."

Extract of Letter to Mr. Foster from Mr. Harry Chester dated 26th Oct., 1867.

"The presumptions are certainly unfavourable to the poor *Bombyx ricini;* but, though it may not have succeeded at Malta, in Germany, or in Italy, or even in Grenada, it might be worth while to try it in the Bahamas; and it would certainly be worth while to obtain a little more information about it.

"The castor oil plant is stated to be a common and vigorous weed in the Bahamas. It was not a native of Malta, nor of any part of Germany, and does not flourish strongly in the latitude of North Italy. The castor oil worm is singularly prolific, or rather it produces six or eight broods in the year, and does not destroy the cocoon in escaping from it with its own life. The produce, though, as you say, not the beautiful and high-priced silk of the mulberry worm, is far more durable; and, if it could be brought to market in sufficient quantities, would certainly command a price either as a cheap substitute for the more costly silks, or as a material useful to be worked up with silk, or wool, or cotton.

"I suggest that application should be made to the foreign, colonial, and Indian offices for such information as they can obtain for us respecting the management of the insect, and the treatment of the cocoons, and the manufacture of their products in Assam and other parts of India, in the colonies, and elsewhere."

PARIS EXHIBITION.

Our last notes on the Exhibition referred to the foreign portions of the second group, or applied art. We now propose to say a few words on the next group, which includes under the title of furniture all the articles used in dwellings. Here we see the products or effects of applied art in one of their most extensive phases, and it is satisfactory to note that in most of the classes there are undoubted signs of progress in the right direction. The French section is far too crowded, and contains a vast amount of objects which have little novelty to recommend them, but the best examples to be found there deserve and have obtained great attention; the glaring white and gold furniture, and the tortuous forms of the Louis XV. and Louis XVI. styles have almost disappeared, and in their place we find pure forms, not overloaded with decoration but sparingly relieved by a small amount of exquisite ornamentation. The most remarkable specimens of fine furniture work are bookcases and cabinets, in oak and ebony, enriched with carving, and frequently also with *lapis lazuli* and other hard stones. Many of these productions are equal to those of any age or country, admirable in design and perfect in execution, and we are glad to find that the South Kensington Museum has secured some good examples for the education of our own students in applied art. Paperhangings naturally follow furniture, and accordingly we find the best specimens of this beautiful manufacture, remarkable, not for extreme elaboration, as they were a few years since, but for purity and simplicity of design and sobriety of colour; the more elaborate and showy patterns are mostly founded on Chinese, Japanese, and old stamped leather models, and many of these are very beautiful. The same remarks will apply generally to furniture stuffs, while the new patterns of the unglazed chintzes now in vogue exhibit great excellence in design and colour. In marble and stone work we see without regret an almost total absence of the old heavy ormolu decoration, which, with its companion buhl work, seems almost extinct. Where gold and colour are introduced they are used judiciously, and as essential portions of the design, not as additional decoration. The metal branches show quite as much progress as the former; in the best articles the ornamentation is at once more sparingly and more effectively introduced; iron, copper, and lead are now decorated as they were in the best days of applied art, by means of the punch and the hammer, and many of the examples of casting are shown as they came from the moulds, and evince an amount of care in their production which is beyond all praise. The forms of the best works in iron, bronze, or other metal work are greatly improved, and the application of bold incised enamel work is becoming a remarkable feature in this class of productions.

The above remarks apply to first-class work; as regards the rest, it must be admitted that there is far more elaboration than taste, and far more ornament than effect. Here and there cheapness is obtained by simple means, with utility and elegance for the result; but generally the lower classes of French decorative work offer more warnings than examples.

The glass department is conspicuous for the size and mass of its contents; the specimens of plate glass are remarkably large, and fine in colour, while the large crystal work, chandeliers, candelabra, and lustres are generally over elaborate in design, and not of good colour. As regards table-glass, the French make three sorts—crystal, demi-crystal, and ordinary glass; with respect to form and colour, their productions are generally inferior to those of England, and the same amount of art does not appear in the decoration that is to be found in other classes of manufacture. In the intermediate kind of glass, the demi-crystal, which is not produced in England, the simplicity of the forms, and the extreme cheapness of the articles, invite the careful study and imitation of our manufacturers.

Perhaps in no branch of decorative work is there less apparent progress than in the manufactures of Sèvres; the exhibition of porcelain is very fine, but there is little of novelty or improvement either in the

taste or execution of the ornamental portions, except that elaborate compositions have almost entirely disappeared from dessert services and other ware, on which they were certainly out of place. The principal novelty in decoration is the production of ornaments in relief, by the super-position of one kind of material upon another, but it is generally admitted that the English potters exhibit in this kind of work quite as much, if not more, ability than their rivals. If the highest class of decorative porcelain exhibit no special progress, it is impossible to speak too highly of the commoner kinds of china, and especially of the beautiful white Sèvres, Limousin, and other ware; the body, glaze, and forms of these wares are all admirable, and some of the large specimens, especially a white vase, at least ten or twelve feet high, are marvels of ceramic workmanship.

It is in the collection of *faïences* that we must look for the progress which has taken place in the production of decorative ware in France during the last few years, and this progress is not only great but in the right direction. The potters commenced by copying the works of Palissy and the great Italian and other potters, as well as the productions of China, Japan, and Persia, and they have produced some very remarkable works in this way, but of late an entirely new style of decoration has arisen, artists of eminence have studied the conditions of the manufacture, and, throwing aside all conventional rules, have produced, especially on medallions and slabs, a large amount of exquisite work, simple in treatment and brilliant in colouring. No compartment in the whole exhibition does France higher credit than that which contains her *faïences*, and when we consider that England is making rapid progress in the same direction, we have a right to expect great results during the next few years; but no one interested in this class of production should fail to study the treatment of the best French ceramic artists.

The show of gold, silver, and gilt ware is very large, but cannot be said to exhibit any remarkable progress in art; in fact, the absence of real art here is painfully apparent; the greater portion of the plate is remarkable for over-elaborate decoration and want of fitness in design, while there is an almost entire absence of those exquisite caskets and ornamental works which we were accustomed to a few years since. Amongst the few novelties are some very charming applications of the Chinese system of enamelling—but whether *cloisonné* or incised we are unable to say—and some beautiful translucent enamels. M. Lepec exhibits a very remarkable collection of the latter kind, which has won for him not only high honours but universal attention; his colours, if not always quite harmonious, are extremely brilliant and varied, and his exhibition marks a positive step towards the revival of this beautiful art.

The Prussian department contains a fine collection of china and decorative earthenware in old styles, while the newer kinds are not remarkable for excellence either in design or colour, and the table ware is generally imitated from French or English forms. The glory of the Prussian section of this group is the collection of fine iron and other castings which is completely without a rival; these beautiful reproductions will almost bear microscopic examination, and if any reproduction could equal an original work, the Berlin shields and tazze would do so. The Prussian carpets also show great improvement in design and harmony of colour.

The Austrian court makes a brilliant show; the coloured Bohemian and Viennese glass is very fine, and the plain table glass vies with that of France and England, but the decorations of the finer kinds of glass are in the old cut style. The show of table china is good, but French in its form and designs. Amongst the most remarkable productions are some very fine pieces of table glass mounted in fine gilt-work, gilt candelabra, and ornaments and imitative silver and steel work. In fabrics, the imitation Persian carpets, furniture damasks, tapestry hangings, and table-covers, are remarkable.

The Russian Court in this, as in the other groups, has a special character of its own, and a very attractive one. The goldsmiths' work, real and imitative, is decorated in niello and other work with great taste and skill; and the forms being essentially eastern in their origin, offer a pleasing variety, and the same remarks apply to the decorated earthenware, specimens of which have been secured for our art schools. The gem of the court, however, is the grand specimen of mosaic-work, representing a group of the Saints of the Greek Church, one of the finest modern mosaics produced.

The Italian court is also remarkable for mosaics, Signor Salviati, of Venice, making a splendid show of copies of the *chefs-d'œuvre;* we are unaware how much Russian mosaics owe to foreign aid, but there can be no doubt about the origin of the Salviati mosaics, which are admirable examples of the resuscitation of a fine old art in the place of its birth. Italian art shows well, and holds out promise for the future; her sculpture forms one of the most attractive features of the Exhibition, and the group with which we are now engaged is rich in Florentine ware in the old style, coloured and decorated Venetian glass, and Florentine mosaic and inlaid work, and daring carvings in hard stone, such as porphyry vases, covered with flowers, which force our admiration, in spite of all the rules of art and questions of fitness.

The collection of decorative works from the East is large and fine, but presents little novelty. The Persian carpets, which are here seen in large numbers, have attracted great and deserved attention; for design, colour, and perfection of workmanship they still surpass all that Europe can produce, great as the improvement has been in the latter, especially during the last few years. It is pleasing to note the excellent effect of the study of these and similar fabrics in the carpets exhibited in the English section, which have called forth great admiration; the jury has marked its appreciation by awarding two gold medals for carpets to great Britain—one to Kidderminster, the other to Glasgow, France only receiving the like number, Austria but one, and no other nation of Western Europe so high a distinction. Few classes show so much progress as the carpet manufacture in point of design and harmony of colour, and this is fortunate, especially for England, where the carpet plays so large a part in the general effect of a room.

OPENING OF THE GREAT CENTRAL CATTLE MARKET OF PARIS.

The large establishment created at La Villette, on the outskirts of Paris, for the sale and slaughter of animals used for food, has been described in the columns of the *Journal*. The abattoirs have been in operation for some time, and the cattle-market was opened on the 21st of October. The constructions completed to the present time consist of three immense halls, built much in the same manner as the great *halles centrales*, or market of Paris, at the east end of the Rue St. Honoré, that is to say, principally of corrugated iron and glass. The central hall is for horned cattle, that on the right hand for calves and pigs, and the other for sheep; near the halls are two large streams of water, with sloping sides, through which the cattle are driven and thus refreshed, and beyond are large laystalls and pens. The buildings were filled to overflowing on the first day, and the extension of the halls and laystalls, which has been provided for, is to be carried out forthwith. The present market will contain upwards of 40,000 animals of all kinds, and when the buildings are completed half as many again. The sales on the opening day amounted to 3,527 oxen, 467 cows, 250 calves, 13,997 sheep, 204 pigs; in all 18,545, of a total value of about £120,000. A considerable portion of the sheep came from Germany. The fees charged for standings are as follow:—Bulls, oxen, and cows,

2fr. 50c. per head; calves, 1fr.; pigs and sheep, 50c. each. These fees are charged each time that an animal is exposed for sale. The establishment includes an exchange, a bank, and a café restaurant and buffet now in course of completion. The dealers draw lots every morning for the places which they are to occupy in the halls. The markets are open every day in the week, but not on Sunday, and all the other cattle markets in Paris were closed when the new one was opened. The means of communication are admirable. The establishment stands close to the circular boulevard which lies round Paris, just within the fortifications, and has on one side a canal, and on the other the *Chemin de Fer de Ceinture*, which communicates with all the great lines of railway and all parts of the capital. This new establishment is certainly one of the most important and remarkable with which Paris has been endowed for many years.

STEAM-PLOUGHING IN FRANCE.

The experiments which have lately taken place at Petit-Bourg, under the auspices of an independent committee of agriculturists, have brought the systems of Howard and Fowler forcibly to the attention of French agriculturists, and cannot fail to be productive of important results. These trials are all the more important from the fact that they are not competitive, that there are no prizes to be given, and that every operation is watched, reported, and commented on by competent judges and witnesses; it is a practical exposition of facts before an experienced audience. The experiments are recorded, and the steam ploughs illustrated at length in the pages of an excellent and comparatively new publication, the *Journal de l'Agriculture*, founded and conducted by M. J. A. Barral. The deductions drawn from the experiments in question are naturally various, and in some measure contradictory, and the views taken by M. Gueyraud, an eminent agriculturist, will indicate the tenor of these opinions, and at the same time furnish matter for useful discussion. This gentleman objects to the conclusion that had been drawn by others, to the effect that the problem of steam ploughing was solved in the case of large farms and soils not encumbered with stones, but not in other cases; he expresses his conviction of the admirable working of both Fowler's and Howard's systems, and adds, that four years' experience of the lattter has led him to a totally opposite conclusion to that stated above. He says:—"For all superficial operations, and in all soils free from stones and difficulties, ploughs, extirpators, and other implements drawn by animals give a more economical if not a more regular result than the steam plough. When the depth exceeds about ten inches, which would require the use of four horses at least, when the soil is dry and hard, in stony land in which the course of the implements is impeded, the steam plough is more economical, more effective, and more regular than implements drawn by animals, and the economy increases in geometrical ratio with the difficulties to be overcome.

Now, as middling-sized and small farms are cultivated to a greater depth, says M. Gueyraud, than large ones (and herein lies the secret of their crops), the former have more to gain from steam cultivation than the latter. It is true, he adds, that each small farmer could not afford to purchase a steam plough, but by uniting together they may obtain a machine which costs nothing while idle, whereas horses are doing nothing half the year, and eat every day. M. Gueyraud is further of opinion that the speed attempted with steam ploughs is too great; they generally try to achieve a yard per second, which is too rapid in stony ground, and causes shocks and irregularity in the work, while if the speed be reduced and the width and depth of the furrow increased, there is a positive gain both in regularity and economy. He recommends a speed of about twenty inches per second, and says he has found it most effective. "I must add," he says, "in favour of steam cultivation, that whereas the practical value of traction by animals decreases with the difficulties to be surmounted and the number of animals required, that of a steam plough, on the contrary, increases with the difficulties to be overcome." Conclusions thus derived from long study and practical experience cannot fail to be valuable, if only in inducing serious consideration of the subject to which they refer.

Fine Arts.

Mr. Robert Gower, of Marseilles, whose collection of works of art made the Château de Repentance, near Aix, one of the most famous mansions in the south of France, has bequeathed his gallery, after the death of one person, to the town of Liverpool, on condition that a special gallery is erected to receive the collection, and allow of its being arranged in the same manner as it is at present. Should Liverpool decline the conditions, the same offer is then to be made to Manchester, Edinburgh, and, finally, to Newcastle; and in case of the refusal of all these towns, the collection is to be offered, on the same terms, to Dijon, Bordeaux, Aix, and Marseilles successively. Should all decline, then the gallery is to be disposed of by auction, and the interest of the proceeds to go to the deceased's nephew and his heirs.

Gustave Doré.—It is given as a fact, on Doré's own authority, that by May, 1862, his published designs amounted to at least 44,000. No doubt, as the recorder of this astounding fact observes, designs of which the total is so enormous demand to be individually estimated by a standard somewhat different from what would be applied to works produced with greater effort and deliberation. We cannot condemn Doré's performances because they do not exhibit all the qualities of riper art, unless, indeed, we go to the length of saying that such immediate outpourings are not allowable art at all. The fact that a painter and designer of twenty-nine had published 44,000 works, many of them of unusual size in their several classes, and crammed with figures and with every sort of scenic or accessory material, is certainly most extraordinary.

Commerce.

Trinidad Asphaltum.—Three varieties of this are shown at the Paris Exhibition. The Pitch Lake of Brea, one of the greatest curiosities of Trinidad, covers 100 acres, and yields inexhaustible supplies of asphalte, which, though largely sent to Europe and America, has not met with the attention it deserves. Lacquer pitch, found in the vicinity of the Pitch Lake, is recommended as an ingredient entering into the composition of dark-coloured varnishes. Its commercial value is great, but the supply is by no means ample. Larger quantities may possibly be obtained by deep sinking. The export of asphalte from Trinidad in 1865 was 17,700 tons, principally to Belgium, France, and England. One company in the island has entered into a contract to supply 1,500 tons yearly of asphalte, in blocks fit for paving, at nine dollars the ton, delivered on board. The same company has engaged to furnish a house at Antwerp with 20,000 tons at 50s. per ton, to extract oil from.

Consumption of Tobacco in France.—The consumption of tobacco has increased enormously since 1709, when the produce of its sale was £1,200,000 sterling. In 1811 the revenue was only £640,000. After this it began to increase rapidly, and in 1815 the net revenue attained the sum of £1,280,000; in 1825, £1,760,000; in 1835 it went down to £1,240,000; in 1846 it reached the sum of £3,280,000; in 1855, to £4,520,000; and finally, in 1866, the sum of seven millions sterling. The quantity of tobacco sold in the year 1615 was 19,759,091lbs., and at the present moment it amounts to 66 millions of lbs. yearly. From 46 to 49

millions of pounds of tobacco per annum are grown in France. Algeria furnishes about 7,480,000lbs. The consumption of tobacco in France being so much greater than its production, the difference is furnished by America, which produces annually 286 millions of pounds of tobacco, which are exported to every country in Europe.

Cultivation of the Sorghum in France.—A letter by M. Joulie, quoted in *The Produce Markets' Review*, says:—"Sorghum sugar grows readily all over France, but it only arrives regularly at maturity in the south, as far as the latitude of Lyons. So if the manufacture of sugar from the sorghum plant could be systematised, it is chiefly in the southern provinces that it would develope a prosperity such as arises in the north from the cultivation of the beet. The cultivation is the simplest possible; as soon as the temperature permits, about the end of March or the beginning of April, the sowing takes place in a properly prepared and ripe soil. The seeds are placed three or four together in holes, about sixty centimetres apart in every direction, and then covered up with two or three centimetres of earth. As the seed is enveloped in two black, hardy coverings to protect it from the damp, its germinative power is extremely slow; this can, however, be easily remedied by soaking the seeds in water two or three days before the sowing takes place. When the sorghum is destined for the production of sugar we must leave only three or four stalks on each tuft, and cut off all the side shoots. This is an indispensable condition if we want to obtain crystallisable sugar; and it can be easily effected by stripping the leaves off the sorghum two or three times during its growth; first when the plant is about thirty centimetres high, next when it is about a metre in height, and lastly when the ears or spikes begin to make their appearance. With these precautions the plant is developed with regularity, and furnishes stems which grow ripe at the same time. My first essays with this plant date as far back as the year 1856, and since that period each crop has supplied me with its own contingent of interesting facts. In the year 1864 I brought together my scattered writings on the subject, and published them under the form of a pamphlet, to which the Pharmaceutical Society of Paris awarded its gold medal. Since that time I have continued my researches, and have gathered new facts, and although the sorghum sugar is as yet only the product of the laboratory, I think I am not stating too much when I say that the time is not very far distant when this plant, cultivated and extended in the south of France, with all the aid that science can give, will be the means of bringing to these districts, which have been so impoverished by the losses from the silkworms, a degree of prosperity analogous to that which the north enjoys by means of the beetroot. The boundaries of our sugar industry would thus be considerably extended, and the beautiful southern districts would no longer be subjected to those violent crises which arise from the slightest variations in the price of corn. Ever since the introduction into France of the seeds of the sorghum sugar by M. de Montigny, this plant has been the object of exaggerated infatuation in the first instance, and finally of undeserved neglect. But sagacious agriculturists have not failed to discern in the meantime that this new graminiferous plant could supply them with a resource in the way of fodder of considerable value, and the culture of this sorghum fodder has accordingly spread unceasingly in the south and in the centre of France."

Injury to Coffee Plantations.—"How many of your readers, I wonder," says the Madras correspondent of the *Times*, October 22nd, "have heard of the 'borer.' I never myself remember to have seen its name in any English newspaper. But here, in Madras, it has long filled the columns of our press, and lorded it over our dinner tables, until just now it had to give place to the Abyssinian expedition. It is a kind of small grub which infests coffee plantations, and which in the coffee districts of this Presidency has done, and is doing, mischief incalculable. A planter told me yesterday that on one of his estates, 320 acres, or about 400,000 trees, had in one season been entirely and irretrievably destroyed by it. He estimated the yearly produce of these trees at £10,000, and considered that of this about half was net profit. The destruction was so sudden as to be inevitable. He had no intimation whatever of danger until he saw the leaves turn yellow and droop, and the trees were then past all hope. This may have been an exceptionally bad case (I mean as regards the extent of the calamity, not as regards the nature, which is almost invariably the same), but there are many more very like. Here and there planters have been positively ruined, and obliged to give up their estates, and leave their homes. There is a report that the Madras Government think of appointing a special commissioner to investigate the subject, and it is, without doubt, well worthy of Governmental notice, for though many doughty champions have entered the list against him, and many schemes have been confidently recommended for his overthrow, the borer does not yet seem to have found his match."

Colonies.

New Zealand Coal.—It is satisfactory to state that coal has been found in New Zealand suitable for the use of steamers on long sea voyages. There are mines at the Buller and the Grey, and other mines within sixty miles of Nelson, that could be worked, the coals could be put into trucks at 3s. to 5s. per ton, brought by rail and delivered at the port of Nelson at 15s., which would leave a large margin for profit, whilst it would be a saving to the steam companies of about 10s. per ton, the price of imported coal being 30s. to 35s. Here opens a vast field of operations for the port of Nelson to supply the steam-vessels now trading to the port, also to the cities of Nelson, Wellington, Auckland, &c. The Panama boats are supplied at their coaling station at Panama chiefly from Cardiff, at great cost, viz., £4 per ton, taking colliers about 180 days, whilst from Nelson coals could be supplied at about half the price, and in about six weeks. It is pretty obvious, therefore, that Nelson, being 1,000 miles nearer than New South Wales would supply Panama and Oparo, the coaling depôt of the Panama New Zealand Royal Mail Company in the Pacific, which latter could be reached in about a month. This is a matter of the utmost importance in the Panama service, each boat requiring about 1,400 tons for the run, making, with the coasting steamers of this company, about 80,000 tons per annum, and there are other companies whose vessels would coal at Nelson. It appears that the quantity of coals exported from Newcastle to New South Wales, in 1866, was 645,615 tons, a large portion of which is consumed in New Zealand.

Progress of the Australian Colonies.—The area of Australia is 2,582,070 square miles, and its total population in 1861 was 1,266,432. In the year 1865 the gross amount of public revenue in the country was £8,958,092, and the gross amount of expenditure £9,147,499. The total tonnage of vessels entered and cleared during the same year was 4,091,467. During the last fifteen years the value of imports has been largely increasing—in 1852 it was £8,086,225, and in 1865, £35,145,053. The exports have increased from £15,500,000 to more than £30,000,000; and the value of exports to the United Kingdom alone has risen by about £2,000,000. The revenue of New South Wales has increased from £682,000 to over £2,000,000 during the past fifteen years. The exports of gold from Victoria, in 1865, were valued at £6,190,317, and that from New Zealand at £2,252,689. The wool exported from New South Wales in the same year was £2,253,149, and that from South Australia was valued at £974,397.

Immigration.—Victoria, which is the most populous colony of Australia, is, just at the present time, show-

ing the greatest anxiety about increased immigration. Although very much smaller in area than New South Wales, Victoria has a larger population by nearly a quarter of a million. In round numbers, the population of New South Wales is about 400,000; and that of the southern colony 650,000. This great advance has been mainly due to the attraction of the gold-fields, and not to any legislative policy. The annual immigration paid for out of the public fund has, no doubt, helped considerably to swell the numbers, but it would never have peopled the colony up to its present standard. In the great burst of its prosperity Victoria drained the other colonies pretty freely, and also drew largely on America and the old country, but in its turn it has suffered from depletion. Every rush to a gold-field in New South Wales has drawn largely from Victoria. Since the intercolonial communication coastwise has been so abundantly provided for by commodious steamers, there has been a large passing to and fro of passengers. A great many emigrants, who were imported into South Australia at the expense of that colony, continued the journey to Victoria at their own cost; and scores, who lately went to Queensland, have come down south, into New South Wales, thus repaying in part the intercolonial emigration to the new colony which was so marked during the burst of prosperity that followed separation. At the present time there is not only no harmony of action, but no harmony of general policy. Queensland has paid for its immigration in land; New South Wales has paid for it by borrowing money—the most costly and burdensome of all plans; and Victoria and South Australia have paid for it out of the proceeds of land sales, abiding faithful therein to one of the principles of the old Wakefield system. The only point common to the experience of all the colonies, is that immigration has to be purchased in some way or other, unless the attraction of gold can be held out. Gold alone causes a free flow of self-sustained immigration.

Royal Society of Victoria.—At a recent meeting of this Society the Rev. Dr. Bleasdale read a paper on the rubellite, or red tourmaline, a new Victorian gem recently found on Broadfoot lead, Tarrengower. He exhibited a few small specimens of the gem, all embedded in transparent quartz crystals. As a gem, when the colour is perfect, it is of great beauty. Professor Halford reopened a discussion on the phenomena of the blood in cases of snake-poisoning and cholera; and the professor reviewed the leading points of the paper read by him at the last meeting, and in which he had described the blood as minus fibrine, minus oxygen, minus heat, and plus a peculiar new growth of cells. The great similarity of the phenomena in cases of snake-poisoning and cholera led to the inference that the further and microscopic study of the former would give some clue to the nature of the poison believed to exist in zymotic diseases. Dr. D. J. Thomas said he had noticed the presence of the white or colourless corpuscles, spoken of by Professor Halford, in various cases, neither of snake-poisoning nor cholera. He did not believe that the inhalation of oxygen would be of service in cases of snake-bite; but he would rather diminish the oxygen of the body by chloroform fumes and large doses of alcohol.

Obituary.

The Chevalier Gaetano Bonelli, ex-director of the Italian telegraphs, inventor of the well-known telegraphic apparatus which bears his name, and of the electric loom, died on the 30th September. Signor Bonelli was a distinguished man, of great inventive powers, and scarcely passed the prime of life. Members of the Society will recollect the description of his electric loom, given at an evening meeting, in February, 1860, by Mr. Le Neve Foster.*

* See *Journal*, Vol. VIII., p. 207.

Lord Wrottesley, a nobleman who has for many years past devoted himself to the interest of science, died on the 27th October. He was born in August, 1798, and was educated at Christ Church, Oxford, where he took his degree of B.A. in 1819, taking a first class in Disciplinis Mathematicis et Physicis. He took a B.A. in 1823, and in the same year was called to the bar by the Hon. Society of Lincoln's-inn. He was married, in 1821, to Sophia Elizabeth, third daughter to the late Thomas Gifford, Esq., of Chillington. In 1839 he received the gold medal of the Royal Astronomical Society, of which he was one of the founders in 1820, for his "Catalogue of the Right Ascensions of 1,318 Stars." In 1853 he called the attention of the House of Lords to Lieutenant Maury's scheme of meteorological observations and discoveries; and on the 30th November, 1854, succeeded the Earl of Rosse as President of the Royal Society, which he resigned in 1857, being succeeded by Sir Benjamin Brodie. He has served in several royal commissions, and is the author of a work entitled "Thoughts on Government and Legislation." The deceased peer was the second baron. In 1841 he succeeded his father, the first baron, who, from 1820 to 1838, represented Staffordshire in the House of Commons, and who was raised to the peerage in 1838, on the recommendation of Lord Melbourne, who was then Prime Minister. Connected with the Wrottesley barony is a baronetcy, created in 1642, the first baronet having received his title for services in the Royal cause during the civil wars. Lord Wrottesley is succeeded in his title and estates by his son Arthur, who was born in 1824.

Publications Issued.

Handbook of English Literature. By William George Larkins, F.R.G.S., F.S.S., Secretary of the Metropolitan Association for Promoting the Education of Adults. (*Routledge.*)—This hand-book is intended more especially for the use of students in evening and other classes. It is in two parts, prose and dramatic writers forming the first part, and poets, with an appendix on American writers, the second. The history of the literature is sketched from its foundation, and the writers are divided into periods. Before each of these is an introduction which treats of the influences that affected and characterised it. The leading incidents in the life of each author are then given, followed by a list of his works, with a short critical notice and account of each. The work is devoid of long biographical essays and lengthy illustrative extracts, and seems well adapted for the purpose for which it has been compiled. Each part is published separately, and is complete in itself. The price is one shilling each part.

Notes.

The State of Middle Class Education.—At the recent annual meeting of the Birmingham Law Society, a report from the committee was read, from which the following is an extract:—"There have been three preliminary examinations for articled clerks in Birmingham during the year; at the first, 14 were examined, of whom nine were passed by the special examiners; at the second, 13 were examined, of whom 7 passed; and at the third, 15 were examined, of whom 12 passed. The necessity for such examinations is fully shown by the amount of inefficiency in the very first elements of education, reading and writing, displayed by some of the candidates. The local examiners have had in some cases to refuse even their certificate for reading, and the dictation papers frequently disclose an utter inability to spell correctly on the part of the candidates,

most of whom appear to be of respectable parentage, and all of whom are, of course, presumed to have completed their education preparatory to entering our learned profession. The want of thoroughness, indeed, in the groundwork of education is extraordinary, considering the standing of the schools at which the candidates appear frequently to have been educated. The same want of thoroughness is also observable in the more advanced and yet primary subjects of a liberal education; the answers given to very simple questions in geography and history being at times very remarkable, as, for instance, placing the Alps in the Island of Sardinia, describing the Duke of Marlborough as a famous British admiral who commanded the Armada, and our great dramatist, Ben Jonson, as celebrated for his dictionary. These examples sufficiently demonstrate the necessity which exists for the preliminary examinations in general knowledge as a means of testing the fitness of a student to enter the ranks of a liberal profession, and the result, in raising the character of that profession by the exclusion of illiterate or imperfectly-educated persons, cannot but be highly beneficial."

Correspondence.

Memorial Tablets.— Sir,— In the interesting and valuable list which you are giving of the houses in London inhabited by England's worthies, I detect an error in your description of the residence of John Evelyn, the diarist. The house in which he lived was situated on the site of the present 44, Dover-street, now in the occupation of Messrs. Moxon, the eminent publishers. To the rear of the house exist remains of a far older structure, no doubt relics of Evelyn's once suburban retreat. Leigh Hunt makes a note, corroborative of this statement, in his "Rambles about the West-end." Begging the favour of insertion of this note in your valuable *Journal*, I am, &c., J. Bertrand Payne, Mem. Soc. Arts.

Conservative Club, S.W., 26th October, 1867.

MEETINGS FOR THE ENSUING WEEK.

Mon.....Royal Inst., 3. General Monthly Meeting.
Soc. of Engineers, 7.30. Mr. T. W. Worssam, jun., "On Mechanical Laws."
Tues ...Anthropological, 8.
Wed ...Geological. Mr. A. Tylor, "On the Loess and Gravel Deposits of the Valley of the Somme."
Thur ...Linnæan, 8. Mr. W. Theobald, "On the Reptiles of British Guiana."

Patents.

From Commissioners of Patents' Journal, October 25th.

Grants of Provisional Protection.

Batteries—2888—W. R. Lake.
Boilers—2857—J. C. Wilson.
Boilers—2868—J. Buckingham and J. S. Blockey.
Bricks, &c., moulding, &c.—2791—S. Johnson.
Bridges, &c.—2886—H. N. Maynard.
Buildings, constructing, &c.—2878—B. Nicolls.
Buildings, warming and ventilating—2853—R. George.
Busks, securing—2827—J., S. A., G. E., and F. F. Reading.
Casks, bunging—2850—W. R. Lake.
Cocks—2823—R. Garratt.
Corkscrews—2851—G. Twigg.
Corsets—2858—G. Davies.
Cutlery, securing handles and scales to—2876—J. Drabble.
Dyeing apparatus—2843—E. G. P. Thomas.
Eye lotion—2828—A. Ticozzi.
Fabrics—2774—M. Wright.
Fabrics, narrow—2883—W. Gadd and B. Walker.
Feed-water apparatus—2861—A. Helwig.
Fire-arms, breech-loading—2778—H. Haschke.
Fire-escapes, &c.—2824—E. Beningfield.
Fluids, transmission of—2870—R. F. Baré and J. Thomson.
Fountains, portable—2864—G. Angell.
Furnaces and fire-grates—2880—J. C. Pearce.
Furnaces, steam generators, &c.—2792—H. Pinkus.
Gaseliers—2840—W. Potts.
Hats—2882—E. Ward.
Hats, machinery for manufacturing—2838—H. Wallwork.
Hats, planking the bodies of—2855—E. Haigh.
Heating apparatus—2862—R. A. Wright.
Iron—2865—W. E. Newton.
Iron and steel—2832—J. Player.
Iron hoops—2866—W. Butler.
Lace, &c.—2885—W. Redgate and T. Marriott.
Lamp posts—2847—R. Brotherton and J. Maldron.
Madder, treating—2874—E. Leitenberger.
Madder, treating extracts of—2852—A. M. Clark.
Matters, separating soluble from insoluble—2863—E. Leitenberger.
Mattresses, sofas, &c.—2834—R. Reid and E. H. Craigie.
Mill-stones—2842—R. Smith, jun.
Minerals, boring holes in—2830—F. Love, W. Armstrong, and L. Widdowson.
Ordnance, loading heavy—2887—W. R. Lake.
Projectiles—2837—J. H. Johnson.
Rails, bars, &c.—2839—J. James and T. Jones.
Railway carriage and other lamps—2831—J. B. Brown.
Railway signals and brakes—2889—M. A. F. Mennons.
Ribbons—2833—E. G. Wolffgang.
Rice unhusking mill—2856—J. C. Wilson.
Sewing machines, &c.—2705—A. M. Clark.
Ships' bottoms, preventing the fouling of—2848—T. Blackburst.
Ships' propellers—2849—A. F. Hobhouse.
Smoke consumer—2825—J. Dean and T. Turner.
Smoke consumer—2836—J. Barker.
Spinning and twisting machines—1862—W. B. Gray & S. G. Sinclair.
Spinning and twisting machines—2841—J. Speight.
Staircases—2869—C. H. Collette.
Stoppers for bottles, &c.—2829—R. Beard, jun.
Stoppers for bottles, &c.—2860—W. H. May and P. Graham.
Stoves, &c.—2873—R. Canham and J. Thomson.
Street sweeping machines—2845—W. Warren.
Valve closet apparatus—2621—A. M. Clark.
Wheels of traction engines—2875—H. Forman.
Yarns, spinning and twisting—2881—D. E. Blacke.

Inventions with Complete Specifications Filed.

Chairs for dentists, barbers, &c.—2915—O. C. White.
Governors—2913—C. S. Lynch.
Hides, treating—2973—W. Brookes.
Letter paper and envelope combined—2966—N. A. Thoumelet.

Patents Sealed.

1217. G. Pollard.
1225. T. Paton.
1226. W. Crooke & T. Wrightson.
1228. J. Taylor.
1233. J. F. Lawton.
1235. J. Bird.
1236. E. T. Hughes.
1237. P. J. J. Allibert.
1244. G. Severn.
1258. W. E. Gedge.
1268. S. Newington.
1274. H. A. Bonneville.
1275. H. A. Bonneville.
1310. J. Hemsley.
1397. J. Walker.
1665. R. Maynard.
1684. J. Warburton.
1736. S. Hancock.
2031. J. Stirk and H. Byeroft.
2453. J. Storey, W. E. Bickerdike, and W. V. Wilson.
2470. J. Silvester.

From Commissioners of Patents' Journal, October 29th.

Patents Sealed.

1262. H. A. Clum.
1263. J. Howell.
1271. J. Brown.
1283. G. A. J. Schott and J. S. Rosenthal.
1284. T. Wood.
1290. C. Chevron.
1295. J. Heaton.
1300. J. Ramsbottom and T. M. Pearce.
1314. J. Baker.
1315. P. Brash and W. Young.
1316. T. R. Crampton.
1399. G. Browning.
1439. G. Nimmo.
1625. T. Poultney.
1626. T. Poultney.
2125. W. Taylor.
2192. G. Davies.
2247. C. Touaillon, jun.
2352. H. Bodart and A. Sigodart.

Patents on which the Stamp Duty of £50 has been Paid.

2657. J. Walmsley and N. G. Pitman.
2627. S. S. Anderson.
2635. G. T. Bousfield.
2690. J. Solomon & A. G. Grant.
2687. J. H. Simpson.
2652. J. and R. Cunningham.
2656. P. A. Fontaine-Moreau.
2661. J. Stobo and W. Pollock.
2685. J. L. Norton.
2699. T. Ivory.
2701. W. Rice.
2668. J. and H. Charlton and J. O. Christian.
2673. W. Cormack.
2715. C. W. Wardle and R. McIntyre.
2992. J. McIntosh.

Patents on which the Stamp Duty of £100 has been Paid.

2584. C. Lungley.
2640. T. Neal.
2654. W. E. Newton.
2552. J. Thompson and E. G. and F. A. Fitton.

Journal of the Society of Arts.

FRIDAY, NOVEMBER 8, 1867.

Announcements by the Council.

Notice to Members.

The One-Hundred-and-Fourteenth Session of the Society will commence on Wednesday, the 20th instant, when the Opening Address will be delivered by William Hawes, Esq., F.G.S., Chairman of the Council.

The following are the dates of the Wednesday evening meetings, the chair being taken at 8 o'clock :—

1867.	November	—	—	20	27	
„	December	4	11	18	—	
1868.	January	—	—	15	22	29
„	February	5	12	19	26	
„	March	4	11	18	25	
„	April	1	—	15	22	29
„	May	6	13	20	27	
„	June	—	—	—	24*	

For the Meetings previous to Christmas, the following arrangements have been made :—

November 20.—Opening Address by Wm. Hawes, Esq., F.G.S., Chairman of the Council.

November 27.—"On the Diplomatic and other Conferences held recently in Paris with reference to International Coinage, Weights, and Measures." By Leone Levi, Esq., Professor of Commercial Law in King's College, London.

December 4.—"On the Relation between Health and Wages." By J. H. Stallard, Esq., M.D.

December 11.—"On Industrial and Scientific Education; with Notes on the Systems pursued, and the Works produced, in Continental Schools, as exemplified in the Paris Exhibition, and Suggestions for the Establishment of Trade Schools in England." By Ellis A. Davidson, Esq.

December 18.—"On the Principles that Govern the Future Development of the Marine Boiler, Engine, and Screw Propeller." By N. P. Burgh, Esq., C.E.

A book of blank Tickets of Admission to the Meetings is now being forwarded to each Member, who is privileged to introduce two friends to each Meeting, on their presenting orders signed by him. Additional Tickets will be sent on application.

The first course of Cantor Lectures for the ensuing Session will be on some branch of Chemistry applied to the Arts, by Dr. F. Crace Calvert, F.R.S., and will be delivered in the early part of the Session; the second course will be "On Food," by Dr. Letheby, Medical Officer of Health for the City of London. A third course will be given, the arrangements for which are in progress. Further particulars will be published in the *Journal*. These Lectures are open to Members, each of whom has the privilege of introducing one Friend to each Lecture.

Members are reminded that, should any of their friends be willing to join the Society, the opening of the Session is a favourable opportunity for proposing them.

* The Annual General Meeting: the Chair will be taken at Four o'clock. No Visitors are admitted to this Meeting.

The following Institutions have been received into Union since the last announcement :—

Cork, Catholic Young Men's Society.
Guildford, Working Men's Institution.
Parsonstown, Young Men's Christian Association.
Rugeley, Mechanics' Institution.
York, Church Institute.

Proceedings of the Society.

Memorial Tablets of Great Men and Events.

In order to show how rich the metropolis is in the memory of important personages and events, which it would be desirable to mark by means of tablets on houses, the Council have caused an alphabetical list to be prepared, the fifth part of which is now inserted. Other parts will follow. The Council request the assistance of members of the Society in completing and correcting this list, especially with reference to dates and the insertion of other names.

Whilst the Council intend proceeding with this work, they desire also to see it carried on by others—either by corporate bodies or individuals—and the Council will be happy to be instrumental in procuring suitable tablets from the manufacturers.

Lacy, John (d. 1681), the actor; lived from 1665 to his death in Drury-lane, two doors from Lord Anglesey, and near Cradle-alley. He lies buried "in the farther churchyard" of St. Martin's-in-the-fields.

Lamb, Charles (b. 1775—d. 1834), poet and essayist; born in Crown-office-row, Temple, educated at Christ's Hospital, was a clerk in the East India-house, Leadenhall-street. Lived at No. 4, Inner Temple-lane, Fleet-street; also in Colebrooke-row, Islington; and at No. 20, Russell-street, Covent-garden. He was fond of strolling down Wardour-street.

Lankrink, Prosper Henry (b. 1628—d. 1692), the painter; lived in Piccadilly, in the house now Richardson's Hotel.

Lansdowne, W. Petty, Marquis of (b. 1737—d. 1805); lived in Lansdowne-house, Berkeley-square.

Large, Robert, mercer, the master of Caxton, the inventor of printing; was buried in St. Olave's, Jewry.

Laroone, Marcellus (d. 1702). He drew "The Cries of London, known as Tempest's Cries." Lived in a house on the west side of Bow-street, three doors up, from 1680 to his death.

Laud, William (b. 1573—d. 1644-5), Archbishop of Canterbury; was imprisoned in the Tower, and beheaded on Tower-hill. He was buried in Allhallows, Barking.

Lauderdale, John Maitland, Duke of (d. 1682), one of the celebrated "Cabal" in the reign of Charles II.; lived in Lauderdale-house, Aldersgate-street.

Lawrence, Sir Thomas (b. 1769—d. 1830), P.R.A.; lived at No. 24, and afterwards at No. 29, Old Bond-street; also for many years in No. 65, Russell-square, where he died. He lies buried in St. Paul's Cathedral. His last work was a full-length portrait of George IV. (unfinished), which hangs in the coffee-room of the Athenæum Club, Pall-mall.

Lee, Nathaniel (d. 1691-2), dramatist. He was educated at Westminster School; was confined in Bedlam for five years. He died at the "Bear and Harrow," in Butcher-row, Strand, and lies buried at St. Clement's Danes, Strand. A portrait of him hangs at the Garrick Club.

Leland, John (d. 1552), the father of English antiquaries. Educated at St. Paul's school, and lies buried in St. Michael-the-Querne, Farringdon-within.

Lely, Sir Peter (b. 1617—d. 1680), portrait painter; lived from 1662 to his death at the north-east angle of the Piazza, Covent-garden, and lies buried at St. Paul's, Covent-garden.

Lenthall, William (b. 1591—d. 1662), Speaker of the House of Commons in the time of the Commonwealth; lived in King-street, Covent-garden, in a house on the site of Westminster Fire Office.

L'Estrange, Sir Roger (b. 1616—d. 1704), the printer of the first English newspaper, called the *Public Intelligencer*, in 1663, and many political tracts. He lies buried in the churchyard of St. Giles-in-the-fields.

Leveridge, R., vocalist; after his retirement from the stage he kept a tavern in Tavistock-street, Covent-garden.

Lillie, Charles, of the *Spectator*, a perfumer; lived next door to the "Fountain" Tavern, Fountain-court, Strand, afterwards removed to the east corner of Beaufort-buildings, Strand.

Lilly, William (b. 1602—d. 1681), the astrologer; married at St. George-the-Martyr's, Southwark. Had his first lessons in astrology from one Evans, a Welsh clergyman, in Gunpowder-alley, Shoe-lane. Lived at the corner house "over against Strand-bridge," Strand.

Linacre, Thomas (b. 1460—d. 1524), physician to Henry VIII., and founder of the Royal College of Physicians. He lived at No. 5, Knightrider-street, Doctors'-commons, and bequeathed this house, called the "Stone-house," to the College, who still possess it.

Liston, John (b. 1778—d. 1846), the comedian, and original Paul Pry. First appeared at the Haymarket Theatre. Lived and died at No. 14, St. George's-place. A portrait of him hangs at the Garrick Club. He lies buried in Kensington churchyard.

Liverpool, Robert, Earl of (b. 1770—d. 1828), statesman. Educated at the Charterhouse. Lived at Fife-house, Whitehall.

Locke, John (b. 1632—d. 1704), author and essayist; educated at Westminster School, and lived at Dorset-court, Fleet-street.

Logan, John (d. 1783), a Scottish divine and poet; lived and died in Great Marlborough-street, Oxford-street.

Loggan, David (circ. 1630—1690), the engraver, who is immortalized by Dryden; lived next door to the "Golden Head," in Leicester-fields.

Loudon, George (d. 1713), the landscape gardener. His style of laying out and stocking gardens is styled by Walpole, "verdant sculpture." Lived in Warwick-street, Cockspur-street.

Loughborough, Alex. Wedderburne (b. 1733—d. 1805), Lord Chancellor; lived in Ballimore-house, which now forms the houses on the south-west corner of Guildford-street, Russell-square.

Loutherbourgh, J. P. de (b. 1734—d. 1812), landscape-painter; lived at No. 45, Great Titchfield-street, Marylebone, from 1776 to 1780.

Lovelace, Richard (b. 1618—d. 1658), poet and dramatic writer. He lived in a mean-looking house in Gunpowder-alley, Shoe-lane, where he died. He was confined in the Gatehouse Prison, where he wrote his poems "Althea from Prison." He lies buried in St. Bride's, Fleet-street.

Lowe, Mauritius (d. 1793), painter; lived in 1778 in No. 3, Hedge-lane, now Wentcomb-street, Pall-mall East.

Lynedoch, Thomas Graham, Lord (b. 1749—d. 1843), the hero of Barossa; lived and died in No. 12, Stratton-street, Piccadilly.

Lysons, Samuel (b. 1763—d. 1819), the antiquary, and author of "Magna Britannica;" had chambers at No. 6, King's-bench-walk, Inner Temple.

Lyttleton, Sir Edward (b. 1589—d. 1645), Lord Chief Justice; lived in (No—?) Boswell-court, Fleet-street. Was a member of the Inner Temple.

Macaulay, Lord (d. 1859), historian; lived in the Albany, in set No. 1 F. Here he wrote his "History of England."

Mackintosh, Sir James (b. 1765—d. 1832), statesman and lawyer; lived in 1788 at a wine-merchant's in Clipstone-street, Fitzroy-square. He died at No. 15, Langham-place, Regent-street.

Macklin, Charles (b. 1690—d. 1797), actor and dramatic writer. He delivered his lectures on elocution at Pewterer's Hall, 17, Lime-street. He lived and died at No. 4, Tavistock-row, Covent-garden. He lies buried in St. Paul's, Covent-garden, in a vault under the communion-table.

Major, Thomas (d. 1799), the engraver; lived and died in No. 5, Tavistock-row, Covent-garden, in the front room on the second-floor.

Malmesbury, James Harris, Earl of (b. 1746—d. 1820); lived in No. 21, Hill-street, Berkeley-square.

Malone, Edmund (b. 1741—d. 1812), the Shakespeare commentator and author; lived at No. 23, Foley-place, Regent-street; and in 1800 at No. 58, Queen Anne-street, East, Cavendish-square.

Mansfield, William Murray, Earl of (b. 1704—d. 1793), Lord Chief Justice; when Mr. Murray, he had chambers at No. 5, King's-bench-walk, Inner Temple; afterwards he lived at the north end of the east side of Bloomsbury-square; this was the house which was burnt by the rioters of 1780. A marble statue to his memory, by Flaxman, stands in Westminster Abbey.

Manton, Joseph, the celebrated gun-maker; lived in 1792 in Davies-street, Berkeley-square.

Marriott, Richard, the publisher of Isaac Walton; lived, and published the first edition of the "Complete Angler," at St. Dunstan's-churchyard, Fleet-street.

Marvell, Andrew (b. 1620—d. 1678), patriot, writer, and poet; lived in (No.—?) Maiden-lane, Covent-garden in 1677; buried in St. Giles-in-the-fields. A portrait of him hangs in the British Museum.

Masham, Lady, the celebrated bed-chamber woman of Queen Anne; lived in Cork-street, Burlington-gardens.

Mathews, Charles (b. 1776—d. 1835), comedian; educated at Merchant Taylors' School. One of his first attempts as an actor was made at Short's-gardens, Drury-lane, and another at the lodgings of the aged actor, Charles Macklin, in No. 4, Tavistock-row, Covent-garden. A portrait of him hangs at the Garrick Club.

May, Thomas (b. 1595—d. 1650), a dramatic poet. Buried at St. Margaret's, Westminster.

Mayerne, Sir Theodore (b. 1572—d. 1655), physician to James I. and Charles I. Built and lived in Lindsey-house, Chelsea; also in St. Martin's-lane. Buried, and a monument erected to him, in St. Martin's-in-the-fields. A portrait of him hangs in the College of Physicians.

Maynard, Sir John (b. 1608—d. 1690), serjeant-at-law; lived till his death in Portugal-row, Lincoln's-inn-fields.

Maynwaring, Arthur (b. 1668—d. 1712), political writer and poet; lived in Essex-street, Strand.

Mead, Richard (b. 1675—d. 1754), an eminent physician; lived at No. 49, Great Ormond-street, corner of Powis-place. A monument erected to him in Westminster

Abbey. Portraits of him hang at the Royal College of Physicians and at the Foundling Hospital.

Melbourne, Peniston Lamb, Viscount (b. 1748—d. 1828); lived at the Albany, also at Melbourne-house, Whitehall.

Melbourne, William Lamb, Viscount (b. 1779—d. 1848); lived at No. 39, South-street, Grosvenor-square.

Middlesex, Lionel Cranfield, Earl of (d. 1645), Lord High Treasurer; lived at Beaufort-house, Chelsea. Buried in Westminster Abbey.

Milbourne, Luke (d. 1720), a divine and poet, rector of St. Ethelburga; educated at Merchant Taylors' School.

Mildmay, Sir Walter (d. 1589), Chancellor of the Exchequer, and founder of Emanuel College, Cambridge; lived in 1570 in his house in Paul's-wharf. He lies buried, and a fine monument is erected to him, in St. Bartholomew-the-Great, West Smithfield.

Mill, James (b. 1773—d. 1836), the historian of India; was a clerk in the East India-house, Leadenhall-street.

Milton, John (b. 1608—d. 1674), the poet; born in (No.—?), Bread-street, Cheapside, and baptized in the adjoining church of Allhallows; educated at St. Paul's School. He lived in numerous places in London, amongst them at (No.—?), Aldersgate-street; in the Barbican; in St. Bride's churchyard, Fleet-street; at the house of one Thomson, next to the "Bullhead" Tavern, Charing-cross; at Petty France, St. James's-park; at Jewin-street, where he lived with his third wife; at Little Britain, Aldersgate-street, in the house of an auctioneer named Millington; and he died in Bunhill, opposite the Artillery-ground wall. He was buried in St. Giles, Cripplegate, and a bust to his memory stands in Westminster Abbey. He was married to his second wife at St. Margaret's, Westminster. His grand-daughter kept a chandler's shop in Pelham-street, Spitalfields.

Mohun, Major Michael (d. 1684), actor; lived from 1671-76 on the east side of Bow-street, Covent-garden; on the south side of Great Russell-street, Bloomsbury, in 1665; and in (No.—?) Brownlow-street, Holborn, where he died. He lies buried in St. Giles-in-the-Fields.

Monk, George, Duke of Albemarle, the restorer of Charles II. to his crown and kingdoms; resided in St. James's Palace, and at the Cockpit, Whitehall, where he died. He was married to Anne Clarges, at St. George-the-Martyr, Southwark. He lies buried, and a monument is erected to his memory, in Westminster Abbey.

Monmouth, James, Duke of (d. 1685), lived in a mansion on the site of the present Bateman's-buildings, Soho-square; also in Hedge-lane, now Whitcomb-street, Pall-mall East. He was beheaded, and lies buried in St. Peter's ad Vincula.

Montagu, Lady Mary Wortley (d. 1762), authoress, and introducer of inoculation into this country; baptised at St. Paul's, Covent-garden. Lived at Arlington-street, Piccadilly; also at (No.—?) Cavendish-square; at the Piazza, Covent-garden, and at (No.—?) George-street, Hanover-square. She lies interred in Grosvenor Chapel, Grosvenor-square, South Audley-street.

Montague, Ralph, Duke of (d. 1709), lived at Montague-house, which stood on the site of the British Museum.

Montague, Elizabeth, (b. 1720—d. 1800), authoress; lived in (No.—?) Hill-street, Berkeley-square; also in Montague-place, Portman-square, which is named after her.

Montrose, James, Duke of (d. 1742), celebrated for his fidelity to Charles I. and II.; lived at (No.—?) Hanover-square.

Moore, Thomas (b. 1780), the poet, was a Templar; lived at 33, Bury-street, St. James's.

More, Sir Thomas (b. 1480—d. 1535), Lord Chancellor; was born in Milk-street, Cheapside. He was educated at St. Anthony's Hospital, a free school, which stood in Threadneedle-street; was a student of Lincoln's-inn; lived at Beaufort-house, Chelsea; also in Bucklersbury-street. He was imprisoned in the Tower, condemned to death at Westminster Hall, and executed on Tower-hill. It is probable he was buried at St. Peter's ad Vincula.

Morison, Robert (b. 1620—d. 1683), the botanist and physician; lived in Queen-street, Leicester-square.

Morland, George (b. 1763—d. 1804), the painter; lived in 1780 to 1786 at No. 14, Stephen-street, Tottenham-court-road. He died in Eyre-street-hill, Coldbath-fields, and lies buried in the churchyard of St. James' Chapel, Hampstead-road.

Morland, Sir Samuel (b. 1625—d. 1695), carried on his mechanical and philosophical experiments at Copt-hall, near the Thames, at Vauxhall.

Morley, George (b. 1597—d. 1684), Bishop of Winchester; memorable for having negotiated with the Dutch for the restoration of Charles II.; lived in Cheyne-walk, Chelsea; also in Winchester-house, Southwark.

Mortimer, J. Hamilton (b. 1741—d. 1779), historical painter; lived at (No.—?), Norfolk-street, Strand.

Mountford, William (b. 1659—d. 1692), eminent actor; lived on the east side of Norfolk-street, Strand, about two doors beyond Howard-street.

Mulready, W., R.A.; lived at Lindon-grove, Kensington.

Munden, Joseph S. (b. 1758—d. 1832), comedian; lived at No. 2, Bernard-street, Russell-square. Buried at St. George's, Bloomsbury. A portrait of him hangs at the Garrick Club.

Murphy, Arthur (b. 1730—d. 1805), dramatic writer; lived at No. 1, New-square, Lincoln's-inn, and at No. 14, Queen's-row, Knightsbridge, where he died.

Musgrave, Sir William, presented a collection of prints, books, and MSS. to the British Museum; he lived at No. 9, Park-place, St. James's-square.

Muskerry, Viscountess. She was the celebrated Princess of Babylon of De Grammont's memoirs. Lived in the north-west angle of the Piazza, Covent-garden, in 1676.

Mytens, D. (b. circ. 1590—d. 1656), painter; lived on the west side of St. Martin's-lane from 1622-34.

Nash, John (b. 1752—d. 1835), architect; lived at No. 29, Dover-street, Piccadilly, where he designed Regent-street and Regent's-park; also at Nos. 16 and 14, Regent-street. He designed All Soul's Church, Langham-place; Buckingham Palace, and the United Service Club; he also projected the idea of making the Regent's Canal.

Nash, Thomas (b. 1558—d. 1601), the satirist, died in Picthatch, a street at the back of Middle-row, opposite the Charter House wall, in Goswell-street.

Naunton, Sir Robert (d. 1634—5), statesman and author; lived in the "Town's End," the west end of Pall-mall, in 1632.

Nelson, Horatio, Viscount (b. 1758—d. 1805); lived in (No.—?) Arlington-street; also at No. 141, New Bond-street, in 1797. He lay in state at the Admiralty, Whitehall, and lies buried in St. Paul's Cathedral, where a monument is erected to him. He met the Duke of Wellington only once, and then at the Colonial Office, 14, Downing-street, Whitehall.

Nelson, Robert (b. 1656—d. 1714-15), author of "Fasts and Festivals, &c.;" educated at St. Paul's School; lived at (No.—?) Great Ormond-street; and lies buried at St. George-the-Martyr, Queen-street, Bloomsbury.

Newcastle, William Cavendish, Duke of (b. 1592—d. 1676); lived in Dorset-house, Fleet-street, also in Newcastle-house, Lincoln's-inn-fields.

Newton, Gilbert Stuart, R.A. (b. 1795—d. 1835), painter; lived in No. 41, Great Marlborough-street.

Newton, Sir Isaac (b. 1642—d. 1726-7), philosopher and mathematician; President of the Royal Society. Lived in (No.—?) Jermyn-street, St. James's; also at (No.—?) St. Martin's-street, on the south side of Leicester-square, from 1710 to 1727. He lies buried, and a monument is erected to him, in Westminster Abbey. A portrait of him hangs at the Royal Society, Somerset-house.

Nichols, John (b. 1744—d. 1826), the archæologist; lived at (No. — ?) Highbury-place, Islington; had his printing establishment in Red Lion-court. Buried in the churchyard of St. Mary's, Islington.

Nicolas, Sir Nicholas Harris (b. 1739—d. 1848), antiquary, and editor of "Wilson's Despatches;" lived at No. 55, Torrington-square.

Nollekens, Joseph, sculptor (b. 1737—d. 1823). Baptized at the Roman Catholic Chapel in Duke-street, Lincoln's-inn-fields. He lived and died at No. 9, Mortimer-street, Cavendish-square; and lies buried in the churchyard at Paddington.

North, Sir Dudley (b. 1641—d. 1691), the great swimmer; lived in Basinghall-street.

North, Francis, Earl of Guildford (b. 1638—d. 1685), Lord-Keeper; was a Templar, and the means of greatly improving the drainage of London; lived in Elm-court, Temple.

North, Frederic, Lord, Earl of Guildford (b. 1729—d. 1792), statesman; lived at (No.—?), Grosvenor-square.

Northcote, James, R.A. (b. 1746—d. 1831), painter; lived and died at 8, Argyll-place, Regent-street.

Nottingham, Heneage Finch, Earl of (b. 1621—d. 1682), Lord Chancellor; was a member of the Inner Temple, Charles II. dined with him at the Inner-Temple Hall; lived in Great Queen-street, Lincoln'sInn-fields, when his mace was stolen.

O'Connell, Daniel (b. 1775—d. 1847); lived at No. 19, Bury-street, St. James's, during the struggle for Catholic emancipation, in 1826.

Ogilby, John (b. 1600—d. 1676), geographer, critic, and poet; kept his map warehouse in Whitefriars; lived in the church of St. Bride's, Fleet-street.

Oldfield, Anne (b. 1683—d. 1730), actress; lived at the Haymarket from 1714 to 1726, at a house seven doors from the top of the east side, also at Southampton-street, Strand, and at Lower Grosvenor-street, where she died. She was found one day behind the bar of the "Mitre Tavern," St. James's-market, Jermyn-street, rehearsing the "Scornful Lady," when sixteen years old. Lies buried in Westminster Abbey.

Oliver, Isaac (b. 1556—d, 1617), the miniature painter; lived in Blackfriars, and is buried in St. Anne's church.

O'Neill, Miss (b. 1791), actress; lived on the west side of Clarges-street, Piccadilly.

Onslow, Arthur (b. 1691—d. 1768), the Speaker; lived and died in Great Russell-street, Bloomsbury.

Opie, John, R.A. (b. 1761—d. 1807), painter; lived at 8, Berner's-street, Oxford-street. He lies buried in St. Paul's Cathedral, and a portrait of him hangs at the Dulwich Gallery.

Orleans, Louis-Philippe, Duke of (b. 1747—d. 1793); lived at No. 31, South-street, Grosvenor-square.

Ormond, James Butler, Duke of (b. 1610—d. 1688); lived at Clarendon-house, Piccadilly; also in St. James's-square; buried in Westminster Abbey.

Otway, Thomas (b. 1651—d. 1685), poet and dramatic writer; is said to have died from want, in a public-house on Tower-hill; buried at St. Clement Danes, Strand.

Palmer, John (b. 1747 — d. 1798), actor; built the Royalty Theatre, Wellclose-square; he also played at the Surrey Theatre, Blackfriars-road.

Paoli, Pasquale de (b. 1726—d. 1807), a celebrated Corsican general and patriot; lived at (No. — ?), Upper Seymour-street West; also at (No. — ?), South Audley-street, Grosvenor-square; a bust of him stands in Westminster Abbey.

Parnell, Thomas (b. 1679—d. 1717), poet; lived at (No. — ?), St. James's-place, St. James's-street.

Parsons, Wm. (b. 1735—d. 1795), comedian and painter; was the son of a builder in Bow-lane, Cheapside; a portrait of him hangs at the Garrick Club.

Patrick, Simon, Bishop of Ely (b. 1626—d. 1707; lived at Ely House, which stood on the site of Ely-place, Holborn; was Rector of St. Paul's, Covent-garden, for many years.

Patterson, Samuel (b. 1728—1802), was the first auctioneer of books, singly and in lots. He lived in Essex-house, Strand.

Peel, Sir Robert, statesman; lived at the Privy-gardens. He was married in 1820, at No. 45, Upper Seymour-street West.

Pembroke, Philip-Herbert, Earl of (d. 1649-50); was installed Chancellor of the University of Oxford, at Baynard's Castle-on-the-Thames, immediately below St. Paul's; lived in the Cockpit, Whitehall, also in Durham-house, Strand.

Penderell, Richard (d. 1671); styled the "Preserver and conduct to his Sacred Majesty King Charles II., after his escape from Worcester Fight;" lies buried, and a monument is erected to him, in St. Giles's-in-the-Fields.

Penn, William (b. 1644—d. 1718), the founder of Pennsylvania, and an illustrious Quaker; was born on Tower-hill; lived in Norfolk-street, Strand; was in very bad circumstances, and imprisoned in the Fleet. He often preached at a Quaker's meeting-house in a narrow court opposite the gate of St. Edward-the-Martyr, Lombard-street.

Pennant, Thomas (b. 1726—1798), historian of London, and antiquarian; lived at (No. — ?), George-street, Hanover-square.

Pepys, Samuel (b. 1632—d. 1703); lived at Axe-yard, King-street, Westminster; at Buckingham-street, Strand; at the old Navy Office in Seething-lane, from 1660 to 1669; and at York-buildings, Strand. Was Master of the Clothworkers in 1677. Buried at St. Olave's, Hart-street.

Perceval, Spencer (b. 1762—d. 1812), statesman; lived at No. 57, now 59, Lincoln's-inn-fields. A monument is erected to him in Westminster Abbey.

Perry, James (b. 1756—d. 1821), the editor of the *Morning Chronicle* in the days when this was the great Whig paper. He lived at Tavistock-house, Tavistock-square.

Peter of Colechurch (d. 1205), architect to old London bridge. Was chaplain of St. Mary Colechurch.

Peter the Great (b. 1672—d. 1725), Czar of Russia; lived in Buckingham-street, Strand, also in Norfolk-street, Strand; and in 1698 in York-buildings, Strand. He used to resort to the "Czar's Head," No. 48, Great Tower-street, Tower-hill.

Petty, Sir William (*alias* Graunt) (1623-1687), physician and mathematician, and earliest English writer on political economy; lived in the corner house on the east side of Sackville-street, Piccadilly; also at Token-house-yard, Lothbury.

Philips, Ambrose (b. 1671—d. 1749), pastoral and dramatic poet, and political writer; lived two doors from Slaughter's Coffee-house, in St. Martin's-lane, from 1720 to 1725; also at (No. — ?), Hanover-square, where he died. He lies buried in Grosvenor Chapel, South Audley-street.

Philips, Sir Richard, the bookseller; lived in 48, Brompton-row.

Phillips, T., R.A. (b. 1770—d. 1845), portrait painter; lived for 40 years at No. 8, George-street, Hanover-square, where he died.

Picton, Sir Thomas (d. 1815), fell at Waterloo; lived at No. 146, New Bond-street in 1800. He lies buried in the burial-ground of the parish of St. George's, Hanover square, Bayswater.

Pidgeon, Bat (temp. Queen Anne); well known to all the readers of the "Spectator;" kept his shop at 277, Strand.

Pindar, Sir Paul (d. 1650), a merchant, who gave very largely towards the restoration of Old St. Paul's. Lived at 169, Bishopsgate-street Without.

Pinkerton, John (b. 1758—d. 1826), the historian; lived at No. 9, Tavistock-place, Tavistock-square: also in Lower Eaton-street in 1802.

Pitt, William, Earl of Chatham (b. 1708—d. 1778), statesman; baptised at St. James's Church, Piccadilly.

He was carried to (No. — ?) Downing-street, Whitehall, after his fatal swoon in the House of Lords. He lay in state in the Painted Chamber, Westminster. He lies buried, and a monument is erected to his memory, in Westminster Abbey. A monument of him is also placed in the Guildhall.

Pitt, Right Hon. William (b. 1759—d. 1806), statesman. He was a student at Lincoln's Inn. He lies buried, and a monument is erected to his memory, in Westminster Abbey. His statue in Hanover-square was attempted to be pulled down in 1831 by the Reformers.

Poelemberg, Cornelius (b. 1586—d. 1660), the artist; lived in Archer-street, Great Windmill-street, Piccadilly.

Pope, Alexander (b. 1688—d. 1744), poet; born in (No. — ?) Lombard-street, at his father's linendraper's shop. Was at school at Marylebone, and Hyde-park-corner. He lived in St. James's-street. He became first acquainted with Warburton at Robinson's book shop, Inner Temple-lane.

Pope, Miss (b. 1743—d. 1818), the actress; lived and died at 17, Michael-place, Brompton.

Pope, Mrs. (d. 1797), actress; she lived and died in Halfmoon-street, Piccadilly.

Pope, Sir Thomas (b. 1508—d. 1558), statesman, and founder of Trinity College, Oxford; lived in a large house in Bermondsey.

Porson, Richard (b. 1759—d. 1808), eminent Greek scholar; used to frequent a tavern at No. 20, Maiden-lane, Covent-garden, called the "Cider Cellars." Died in the rooms of the London Institution in the Old Jewry.

Porter, Mrs., the actress, lived over against the "Blue Ball," Arundel-street, Strand.

Portland, Duke of (b. 1738—d. 1809), statesman; lived in Burlington-house.

Prior, Matthew (b. 1664—d. 1731), poet and statesman. He was educated at Westminster School. Lived at (No. — ?) Duke-street, King-street, Westminster. He is buried in Westminster Abbey, and the monument to his memory was erected by himself.

Pritchard, Hannah (b. 1711—d. 1768), actress; she first attracted attention at St. Bartholomew Fair. She lived at (No. — ?) York-street, Covent-garden; and lies buried in Westminster Abbey.

Prynne, William (b. 1600—d. 1669), lawyer and writer; was a student in Lincoln's Inn. He was imprisoned in the Fleet for writing his "Histriomastix," was tried at the Star Chamber, and stood in the pillory in Old Palace Yard. He lies buried in Lincoln's Inn Chapel.

Psalmanazar, George (b. 1679—d. 1763), the pretended converted Japanese; lived in Pall-mall. He compiled his "Universal History" at Sion College, London-wall, and died in Ironmonger-row, Old-street, St. Luke's.

Pulteney, W., Earl of Bath (b. 1682—d. 1764), statesman; lived on the west side of Arlington-street, Piccadilly; also at Bath-house, Piccadilly. He is buried, and a monument erected to his memory, in Westminster Abbey.

Purcell, Henry (b. 1658—d. 1695), musician and composer; lived at (No. — ?) St. Anne's-lane, Great Peter-street, Westminster. He lies buried, and a monument is erected to his memory, in Westminster Abbey.

Pye, Henry James (b. 1745—d. 1813), poet laureate; lived from 1799 to 1800 at No. 2, James-street, Buckingham-gate.

Pym, John (1584-1643), the Puritan, lived in Gray's-inn-lane, Holborn. He died in Denby-house, Canon-row, Westminster.

Proceedings of Institutions.

Bolton Church Institute.—On Monday evening, the 30th September, the prizes and certificates awarded by the Society of Arts and the Department of Science and Art to the candidates connected with this institution, were distributed by John Hick, Esq., of Hill Top. There was a large attendance. The platform was occupied by the Rev. Canon Powell (who presided), the Mayor (F. Ferguson, Esq.), Lieut.-Col. Gray, M.P., the Rev. Canon Thicknesse, the Rev. J. S. Birley, the Rev. T. Berry, Rev. A. Birley, Rev. A. Packer, Rev. J. Lowe (secretary of the Institute), and many others.—The Rev. Vicar commenced the proceedings by observing that they were assembled to inaugurate another working year of the Bolton Church Institute. The operations of last year had largely exceeded their expectations, having had 104 honorary members paying annual subscriptions; 683 quarterly tickets had been sold, the total number of persons who had partaken of the advantages of the Institution being 332. Thus the Institution had been doing its work well. They had now within those walls a flourishing day school, where 70 young gentlemen were having a thoroughly good English liberal education; then they had a reading-room extensively patronised, and well supplied with periodicals and newspapers; and also a museum, with about 1,000 specimens. But the great work going on had been in connection with the classes. —Mr. John Hick delivered an address, and presented the prizes and certificates, concluding his remarks as follows:—"It is further a source of much gratification to find that although we have been at work so short a time, comparatively, our position as an Institution in the Society of Arts' Examination is a good one. Preston only is before us, and that is an older Institution, and we have only to go on steadily persevering, and a still better result is sure to follow. The percentage of failures by the pupils who attended the examinations was very small; but the percentage of those who did not present themselves for examination was much too large; and I would strongly urge upon these latter to make a strong and determined effort this session. Before concluding my remarks, I must just give you a short quotation from the report of Mr. Anderson, Inspector of Machinery at the Royal Arsenal of Woolwich, upon the class in which he has been a juror in Paris. He says —'That there has been no lack of talent or invention is abundantly evidenced by our past history; but unless we have the same advantages, especially in regard to theoretical and mathematical education, which are so abundantly enjoyed by other countries, the competition becomes so unequal that no inherent skill can long withstand it. We require better education for all our leading workmen, and more especially for draughtsmen, foremen, managers, and masters too, and to be given in such abundance all over the kingdom as will not make the possessor the exception, and so cause him to feel above the drudgery of his daily work. Such a general diffusion of systematic theoretical knowledge relating to the principles on which engineering and machine-making depends, will bring out the latent talent of this country. Of practical knowledge and skill there is great abundance, and when in addition the head has been trained as well as the hands, together with the inherent perseverence of our national character, we may still hope to retain our position in the world.' Now, these remarks were in reference to our position as manufacturers of steam-engines and machinery generally, but they are much more generally applicable."—Ald. R. Harwood then briefly explained the circumstances under which he made the offer of a £5 prize to the person who obtained the greatest number of first-class prizes and certificates during the year. It was competed for by two individuals last year who had obtained three first-class prizes—something quite unknown before. The prize was divided last year, and the same result had happened on

this occasion.—Lieut.-Col. Grey proposed a vote of thanks to Mr. Hick for distributing the prizes, and for his sound and practical address.—The Rev. J. S. Birley, who was introduced by the Vicar as one of the founders of the Institution, seconded the motion, and delivered an address on the value of such Institutions.—The Mayor, after a complimentary allusion to Mr. Hick, who was well able to dwell upon the importance of technical education amongst the artizans of this country, expressed his entire sympathy with the remarks of Mr. Birley. The resolution was then put and carried with acclamation. There was a splendid exhibition of works of art and of scientific and mechanical productions on the occasion.

THE GLASS WORKS OF VENICE AND MURANO.

From an early date the city of Venice has been celebrated for its glass. In the 13th century the processes of the Phœnicians, who had long enjoyed the exclusive production of glass (in consequence of the abundance of its principal ingredients, natron, sand, and fuel, on their coasts), seem to have been learnt by the Crusaders, and transferred to Venice and the neighbouring island of Murano, where they were long held secret, and formed a lucrative commercial monopoly.

The old Venetian blown glass was light, bright, vitreous in appearance, stained with the richest possible colours, and fashioned into shapes which varied with the individual taste and skill of the workman; this branch of industry, during the fifteenth and two following centuries, rose to a pitch of excellence which obtained for it a world-wide reputation.

Some of the particular secrets of this beautiful manufacture have been handed down from father to son, and so carefully treasured up, that at this very day, quite as much as in the age of Marco Polo, Venice possesses the absolute monopoly of the art. Lineal descendants of the old Venetian glass manufacturers still inhabit the island of Murano; but the demand for the produce of their ancient handicraft has been so unimportant, that these workmen were driven to seek subsistence by the production of a more common-place material for every day use.

The revival of the ancient art of glass-blowing is due to Dr. Salviati, whose imitations of the old Venetian *soffiati* and execution of new designs are most successful, and have excited universal admiration at the Paris Exhibition. The *soffiati*, or blown glass, produced by Dr. Salviati, equal, and even surpass, the old in lightness, brilliancy, colour, and design. The glass blowers of Murano are now able to produce nearly all the famous kinds of ware so peculiar to Venetian glass, and which were thought to be entirely lost, such as "filigree" *fiamma*, *retorto*, opal or girasole, *avventurina*, *reticello*, frosted or "crackle" glass, *morise*, *millefiori*, *acqua marina*, rich ruby colours, *giallo d'oro*, and many other kinds of work, some of which are imitations of the old glass and some new inventions.

It is hardly possible in words alone to convey a correct idea of the manipulations necessary for the formation of a bottle of the simplest form. The tools used are an iron tube about five feet in length, a few instruments like shears, of different sizes, and stamps with a strawberry-shaped die. The workman first dips the end of the tube into the pot of molten glass, twisting it round so as to accumulate a sufficient quantity of glass to make the required bottle, a few turns of the rod, and a breath or two into it, and a hollow ball appears at the end, and the required shape is given to the hollow globe by means of the shear-like instruments, whilst being rotated on the glass maker's chair; a "pontil" is then attached opposite to the tube, which is then broken off. After being reheated in the furnace the mouth of the bottle is formed; a boy then brings up on the end of a rod a small portion of ruby, acqua marina, or any other colour that may be required to ornament the bottle. This must be so hot as almost to drop off, and must be ready at the exact moment; he touches with it the neck of the bottle, which is rotated on the chair by the glass blower. In this manner rings and other ornaments are wound round the bottle; these rings are scolloped at the same time with the shears by the glass blower. Between these rings little lumps of the same or other coloured glass are then stuck on, and stamped as strawberries with the die. During this operation the bottle has to be introduced several times into the furnace. A vase, not by any means of the most elaborate pattern, required the labour of three pairs of hands during half an hour, in which time it went thirty-five times into the furnace. All this time the glass is drooping and twisting out of shape every time that it is put into the furnace, so that great care is required to retain the form. The finished glass is then put into the annealing oven, where it remains cooling very slowly till the next morning.

The *reticello* is produced by a kind of net-work, consisting of small bubbles of air inclosed within the mass, and arranged in a regular series, crossing and interlacing each other. This ornamental appearance is produced in the following manner:—A tube is made by arranging a number of small glass rods, or *canna*, as they are called, round a centre, so as to form a cylinder, and they are fixed in this position by melted glass. The cylinder is then heated until the rods stick together, and are next drawn out into a long cone, and twisted spirally at the same time; this cone is next inserted into another that has been prepared in a similar manner, but twisted in the contrary direction; the two are then heated until they fuse together. Whenever the little rods cross each other a bubble of air will be enclosed in the diamond shaped space; this occurring in a very regular manner a reticulated appearance is produced.

The "filigree" glass is produced in a somewhat similar manner, but by using rods which contain threads of white or other coloured enamel in a body of clear glass; these filigree rods are prepared by placing in a mould alternately small rods of white and coloured enamel; the workman then prepares a solid ball of clear glass, which, being deposited in the mould in contact with the rods at a welding heat, causes them to adhere; this ball is then taken out and rolled on the iron plate, or "marver," as it is called, into a uniform mass; the ball is then dipped into the pot of clear glass, and then drawn out to the required length and size. Should a spiral rod be required, the mass is twisted during the drawing process.

The *millefiori* are slices of coloured glass rods embedded in a colourless or differently coloured ground of the same material, and are used chiefly for making paper weights.

The *ritorto*, or twisted patterns of many coloured rods are fused together with clear glass. These beautiful striped patterns are very simply made; for a goblet of ruby and aventurine, for instance, a number of rods of the two colours are laid side by side, alternately, on a sort of shovel, and introduced into the furnace. As they begin to melt and adhere together, the workman, with a piece of half-molten glass at the end of his rod, presses upon the end of the first, and turning round the hollow rod winds them all up, so that they come together into the form of a cylinder, the end of which is fixed to the handle that is to control them during the subsequent operations of blowing.

The celebrated frosted, or "crackle" glass, of the Venetians was long considered a lost art; it is made by suddenly plunging the hot glass into cold water, and in this manner fractures are produced of a crystalline character. The glass is then reheated at the furnace, and the heated ball is afterwards expanded by blowing. Although frosted glass appears covered with fractures it is perfectly sonorous.

Venice still possesses the absolute monopoly of the art of bead-making. The manufacture of beads is of the highest antiquity; they are found in the tombs of Thebes, and in the ruined temples of Assyria; in the tombs of Greece

and Rome and even in the burial-places of the ancient Britons we find beads, and these, too, of the particular zig-zag pattern which has always been, and still is, manufactured at Venice, and found over the entire continent of Africa. In the history of the conquest of America these beads played a most important part, and were used by the Spaniards to trade with the natives. At the present time great impetus has been given to the bead-trade on account of the prevailing fashion of black beads, for which there is a great demand.

The bead manufacture, or *conteria*, may be divided into two distinct branches, the first the ordinary bead, or *margaritine*, and the other, *Perle alla Lucerna*, which are a finer, and, consequently, more expensive bead.

The manufacture of *margaritine* is also divided into two sections, the first of common glass beads, *canna di vetro*, and the second *canna di smalti*, or enamel beads. The manufacture of these last differs but slightly from the other, but the "paste" is of a finer quality and more costly.

The furnaces are built of a fire clay, found at Cerone, in the Friuli; these furnaces last about two years, 44 weeks being a year's work. The materials are vitrified in pots (*padellati*) made of pure refractory clay, and for the manufacture of beads are usually four to five in number, each capable of containing about 1,300lbs. of "paste." The furnaces for the finer quality of enamel beads are constructed in a different manner from those for *canna di vetro*. The pots are separated from each other by divisions in the furnace, so that the heat can be regulated according to the colour and quality of the paste.

The principal ingredients used in the manufacture of glass beads are Pola sand, Catania soda, natron (a native sesqui-carbonate of soda, found deposited on the sides of several lakes to the west of the Delta of Egypt), antimony, arsenic, manganese, minium, nitre, etc.

The materials used for the production of enamel beads are far too numerous to be enumerated here; almost every product of the mineral kingdom might be mentioned; amongst others, gold and silver, of which considerable quantities are used. The Venetians are still in possession of the best enamel processes, and they supply the French and other nations with the best kinds of enamels of every possible coloured shade.

The raw materials are first calcined in a reverberatory furnace for about ten or twelve hours, where they are kept at a red heat. Whenever the pots are worked out in the glass furnace, the "frit" is immediately transferred into them from the reverberatories in an ignited state; the glass requires from twelve to seventeen hours, according to its quality, to be melted down.

The drawing out of the glass into tubes, or *canna*, is performed by "shifts" (*muda*) of six hours each. Each shift is composed of the gatherer, or *maestro seagnor*, who dips the end of an iron rod into the pot of melted "metal," and gathering up the requisite quantity of glass by turning the rod round and round. He then hands it over to the two assistants, or *pastonieri*, who roll the plastic lumps of glass on the iron plate, or "marver" until it assumes a cylindrical form about 4½ inches in diameter, according to the quality of bead that is intended to be made; a circular hole is next made with an iron tool *(borsella)* in the direction of the axis of the cylinder, and the other assistant applies the end of a solid iron rod, tipped with melted glass, called a "punto," and thus attaches it to the opposite end of the cylinder; the two rods are then handed over to the *tiratori*, or drawers, who draw the cylinder out into a small tube, in a gallery adjoining the glass house; these galleries are usually about 300 feet in length. At the end of the "shift" these tubes are cut into lengths of about three feet, and packed into boxes, so as to be passed off to the manufactory, where they are reduced into beads. This is quite a separate business, although sometimes carried on in the same establishment as the first. During the last few months, on account of the extraordinary demand and high prices for black beads, most of the glass houses of Murano and Venice have turned their attention to the production of these glass tubes, or *canna*, for bead manufacturers.

For the production of coloured or enamel beads greater care is necessary, as the materials of which they are composed are costly, especially the imitations of coral, cornelian, ruby, opal, agate, mother-of-pearl, &c.; some of these, as the cornelian, are composed of two qualities of paste, the first opaque, forming the core, and the second transparent, of another colour. The tubes, or *canna*, of which the ingredients contain oxide of gold or silver, do not present their true colour until they have undergone a second action of the fire in the process of reduction into beads. Prismatic tubes are also drawn, and are used for different shaped beads.

Besides the production of an infinity of shades of enamels, or *smalti*, as they are called, Murano still preserves the secrets of producing imitations of precious stones of the most dazzling brilliancy, sapphires, rubies, emeralds, topazes, opals, lapis-lazuli, malachite, and *avventurina*, which is exclusively the speciality of Venice and Murano. The inventor of this most beautiful material was the celebrated Miotti in the 13th century, who discovered it by accident, whilst engaged in the preparation of a certain enamel for mosaic, the name *avventurina* was given to it from *avventura*, which signifies chance. According to the most eminent chemists, avventurina owes its rich golden iridescence to a crystalline separation of metallic copper from the mass coloured brown by the peroxide of iron.

The following is an analysis of the avventurina of the present celebrated manufacturer, the Cav. Pietro Bigaglia, of Venice:—

Silicic acid	67·3
Lime	9·0
Protoxide of iron	3·4
Binoxide of tin	2·3
Protoxide of lead	1·0
Metallic copper	4·0
Potash	5·3
Soda	7·0

Almost infinite are the uses to which it can be applied in jewellery and ornamentation. The glass-blowers of Murano are enabled to remelt and introduce it as a decoration to their celebrated glass wares.

The reduction of the glass tubes or *canna* into beads, consist of the following operations:—1st. The sorting of the tubes, according to size, as it is impossible in drawing that they should be all equal. This is done by women (*cernitrici*), who acquire by practice a marvellous dexterity at this work. The sorted tubes are next passed over to the *tagliatori*, who chop them into small pieces of uniform lengths, on the upright edge of a fixed chisel. The next operation is the dividing of the bits of tube from the broken pieces by sifting. The next process is to round off the angular ends of these cylinders, and for this purpose they have to undergo a second action of the fire. The workmen employed for this purpose are called *tubanti*, from the tubes used by them for reducing the little bits of glass into beads. This tube is made either of copper, brass, or iron, and is fixed at the end of an iron rod. Before being put into the tube, these little pieces of glass are put into a mixture of lime and powdered ashes, moistened with a little water, and are stirred about until their cavities are filled up. This is necessary to prevent the bore of the bead being partially or wholly closed whilst undergoing the action of the fire. A certain quantity of the little bits of glass are put into the tube with a proportion of sand and powdered ashes, according to the quality of the beads, to prevent their sticking together. The tube is then introduced into the furnace, the heat of which can be regulated as required, and the workman continues turning it round until the cylindrical bits of glass assume a smooth rounded form. The beads are then allowed to cool slowly and afterwards taken out of the

tube and separated by sifting from the sand and ashes. The beads are then sorted according to their various sizes by sifting, and the perfect are separated from the imperfect by being turned out on to a slightly inclined table,. Those of a perfectly globular form roll off into a box placed below, whilst the imperfect, badly-shaped ones remain on the table. The workmen employed for this purpose are called *governadori*. The beads are next polished in a very simple manner by the *lustradore*, or polisher, who shakes a certain quantity of them in a bag with a little bran. The finished beads are finally threaded on strings, and tied up in bundles of dozens, grosses, &c. This is chiefly done by women and girls (*infilzatrici*).

The art of bead-making at the lamp, "Perle alla Lucerna," is, as we have said before, quite a separate business. In working at the lamp, tubes and rods of glass and enamel are used. It is impossible to describe all the manipulations of this ingenious art, over which the taste and dexterity of the artist so entirely preside. But we may give an example: a black bead, decorated with roses, forget-me-nots, and leaves of aventurine. The artist first takes a rod of black glass, and melting it in the blow-pipe flame of the lamp, twists it about an iron wire until he has made a small ball of the required size, rolling it on a kind of iron mould with a circular groove, and smoothing it with an iron tool until it has acquired a perfectly spherical shape. He then takes a small rod of aventurine, and softening it in the flame,traces on the black glass ball leaves of any other pattern that may be required, and smooths it again with the iron tool. He next traces with a small rod of rose-coloured enamel the roses on the ball, smoothing it as before with the smoothing tool. The forget-me-nots are next traced on the bead with a small rod of blue and white enamel, that has been previously twisted together spirally in the flame, and drawn out to about the diameter of a shawl pin. The bead thus completed is taken off the wire, and left to cool in a box filled with sand.

An endless variety of beads are made in this manner of every possible colour. Gold and silver beads are made by rolling a bead made of common glass, whilst still hot, on a leaf of gold or silver; some of these are ornamented with little points of crystal, ruby, turquoise, &c. Artificial eyes for stuffed birds, animals, and even for human beings, are also made at the lamp. Spun glass of every tint is also made, and is used for making feathers and flowers of most surprising lightness, baskets, mats, trays, and even ladies' hats.

Mosaics also constitute a most important branch of manufacture at Venice, and may be divided into two distinct classes. The first, inlaid, or marqueterie mosaic, which is produced by all the enamel pieces having their edges perfectly close and adherent one to another; such kind of mosaic is generally used for the production of personal ornaments, such as brooches, earrings, bracelets, &c., or objects of household decoration, such as table tops, and other furniture. The Venetian differ from the Florentine and Roman mosaics, being chiefly of complicated geometrical patterns, of extremely showy colours, in enamels, aventurine, artificial agate, chalcedony, lapis lazuli, &c., instead of being made up of stones, as in the Florentine; or like the Roman mosaics, which are manufactured of very thin pieces of enamels of numberless colours, rubbed and polished, and represent landscapes, fruit, flowers, views, animals, &c.

The other kind of mosaic is made by using stone or enamel pieces, cut into shapes which are not quite regular or geometrical. These pieces are then put together more or less near to each other, so that between them the joints are seen, and the work does not in this case appear smooth, but rough. This style of mosaic is known as the Monumental, or Byzantine. This is most fitted and generally adopted for the purpose of architectural decoration, both for the interior and exterior of buildings.

Venice, in nearly all ages, seems to have been the home of mosaic, and here the walls of the fine basilica of St. Mark's have been during many ages covered with masterpieces of mosaic decoration.

In England fine specimens of modern Venetian mosaics may be seen at the South Kensington Museum, and St. Paul's Cathedral, London. The whole vaulted roof of Cardinal Wolsey's Chapel, at Windsor, representing the kings and queens of England, is now being decorated in mosaic, a great part of which is already fixed, and Dr. Salviati is now executing mosaics for the National Memorial to the late Prince Consort, now in course of erection in Hyde-park.

Enamels are much more permanent than any other substance that has been used in the composition of mosaic, whether stone, marble, or clay, on account of their less porous and less dilatable body.

With regard to the gold and silver enamels, which are used with such effect in monumental mosaics, great improvement has been made of late years in their production. On a ground of thick glass, or enamel, according as it is desired to render the gold enamel transparent or opaque, or to impart to it a warm or variegated colour, there is laid a leaf of gold or silver, to which it is attached principally by the action of the fire; then a film of the purest glass is spread over it; this film may be perfectly colourless, or of any tint that may be required. When well manufactured, these three layers, after being fired, become perfectly united to each other, and form a homogeneous body. If this operation be perfectly successful, the metal will be for ever protected against all possibility of injury, either by atmospheric action, dust, gas, smoke, or insects, and in such a manner as not to lose any of its brilliancy or colour, even after many centuries of exposure. When this delicate film of glass possesses the requisite thinness, fineness, and purity, and the whole surface of the sheet exhibits no inequality of thickness, the metal appears in all its native beauty, and the glass with which it is covered is scarcely discernible.

The manufacture of mirrors and chandeliers also forms an important branch of industry. These mirrors are usually decorated with figures, leaves, &c., of most original design, engraved at the back, and are afterwards silvered. The frames of these mirrors are decorated with leaves and flowers in white or coloured glass. These mirrors have obtained a great success at the Paris Exhibition, and are being sent in large quantities to Paris and London.

THE AIR IN RAILWAY TUNNELS.

The following report of an examination of the air in the tunnels of the Metropolitan Railway was read at the inquest upon the body of Elizabeth Stainsby, whose death was alleged to have been caused or accelerated through the foulness of the air in the tunnels of the underground railway. The evidence had shown that the deceased was suffering from disease of heart at the time of her death:—

London, October 23rd, 1867.

Having received instructions from the directors of the Metropolitan Railway Company, through Messrs. Burchell, their solicitors, by letter addressed to Dr. Bachhoffner, to examine and report on the state of the atmosphere in the different tunnels on their line, and on the sanitary condition generally of the stations and tunnels, we beg to present the following as the result of our investigations:—

We proceeded in the first instance to obtain samples of the air in the tunnels, and we collected them on three separate occasions, namely, first, immediately after the trains had ceased running at night; secondly, just before they commenced running in the morning; and, thirdly, in the afternoon between four and five o'clock, the period of the day when there is generally the greatest amount of traffic.

The samples, twenty-eight in number, were taken at different places in each tunnel, and at different altitudes; some near the crown of the arch, some near the ground, and others on a level with the heads of the passengers. These samples were analysed for sulphurous acid, carbonic acid, carbonic oxide, coal gas, and oxygen.

The presence of sulphurous acid was sought for by the most delicate chemical test with which we are acquainted, namely, its action upon iodic acid and starch, which we have ascertained is capable of showing the presence of one part by volume of sulphurous acid in 100,000 parts of air, but we could not in any case discover by such test the presence of this acid, from which we conclude that its volume was less than the above in the tunnels. The proportion of carbonic acid by volume in 10,000 parts of the air in the several tunnels and stations was as follows:—

Tunnel.	Max.	Min.	Mean.
Tunnel between Bishop's-road and Edgware-road, 2 a.m., Sept. 3rd ..	4·1	4·1	4·1
Tunnel between Edgware-road and Baker-street, 1 to 3 a.m., Sept. 3rd	5·2	4·3	4·8
,, 2 to 4 a.m., Sept. 6th	5·4	4·7	5·0
,, 4 p.m., Sept. 7th....	..	..	5·7
Baker-street Station, 4 p.m., Sept. 10th	..	..	6·2
Tunnel between Baker-street and Portland-road, 1 to 3 a.m., Sept. 3rd	6·0	4·6	5·1
,, 2 to 4 a.m., Sept. 6th	4·5	4·2	4·4
,, 4 p.m., Sept. 7th ..	..	..	6·9
Tunnel between Portland-road and Gower-street, 1 to 3 a.m., Sept. 3rd	6·0	5·1	5·5
,, 2 to 4 a.m., Sept. 6th	6·1	4·5	5·1
,, 4 p.m., Sept. 7th....	..	..	12·7
Gower-street Station, 4 p.m., Sept. 7th	..	..	5·7
Tunnel between Gower-street and King's-cross, 1 to 3 a.m., Sept. 3rd	5·4	4·4	4·9
,, 2 to 4 a.m., Sept. 6th	5·2	4·3	4·6
,, 4 p.m., Sept. 7th....	..	..	9·1

The amounts of carbo-hydrogen (coal gas) and of carbonic oxide present were so small as to be barely discoverable by the most delicate processes of analysis. Lastly, we ascertained that the amount of oxygen in the air of the tunnels and stations was not in any case deficient.

These results prove that in no instance was the air found to be vitiated to any material extent, although it will be seen that the air taken in the afternoon was less pure than that taken at night. The researches of Regnault, Bunsen, and other eminent chemists, and more recently those of Dr. Angus Smith, show that what may be termed "model or normal atmospheric air" in cities and large towns consists in every 10,000 parts by volume of

Oxygen	2,096
Nitrogen	7,900
Carbonic acid	4
	10,000

It is the last constituent which when in excess renders the air impure, and, in proportion to its increase, so is the air made unfit for respiration. Experiments conducted by Dr. Bernays and Dr. Angus Smith have shown that in several of our London theatres at about ten o'clock p.m., in many other places of public resort, and especially in some of our law courts, the quantity of carbonic acid in the atmosphere of those places varied from 10 to 32 parts per 10,000; and from the "Army Report," vol. v. page 272, it appears that in some fairly-ventilated barracks at Aldershot the quantity of carbonic acid at midnight amounted to 6·42 per 10,000 of air, and at five p.m. it amounted to 7·59 per 10,000; and in the Wellington Barracks from 11·9 to 14·2 per 10,000. Even in the streets of Manchester, in foggy weather, it has amounted to eight parts per 10,000 of air.*

In order to determine the atmospheric conditions of these tunnels by comparison with the condition of the air in the tunnels of other lines of railway, we took samples of the air from several tunnels near London, and from these, which we designate by numbers only, we obtained the subjoined results:—

	Carbonic acid per 10,000 of Air by volume.
Tunnel No. 1	4·7
,, 2	12·1
,, 3	4·6
,, 4	4·3
,, 5	7·8
,, 6	4·5
,, 7	5·3
,, 8	4·3
,, 9	4·2
,, 10	5·1
,, 11	4·3
,, 12	4·2
,, 13	4·6

Our next inquiries were directed to the quality and quantity of the fuel used in the engines, and to the mode by which its combustion is effected. The plan adopted (with which we cordially agree) is to diminish as far as practicable the combustion of the fuel during the passage of the trains through the tunnels and stations. The steam in the boiler is raised in the open air to a temperature and pressure which, by experience and daily practice, is found sufficient to work the trains through the tunnels; and when the trains come again into open space, fresh steam is then generated sufficient to propel the trains through the next journey, when the process is again repeated; by which means the engine-driver is enabled, when passing through the tunnels and stations, to close the fire-box and damper, so as merely to keep

* AMOUNTS OF CARBONIC ACID PER 10,000 OF AIR IN DIFFERENT PLACES.

	Min.	Max.	Mean.
1. *Cities and Towns:*—			
London	2·8	4·3	3·4
Manchester	4·9	15·0	5·4
Munich	—	—	5·0
Madrid	3·0	8·0	5·2
Paris	3·6	5·1	4.9
2. *Places of Public Resort:*—			
Court of Chancery (doors closed)	...	—	19·8
,, ,, (doors open)	...	—	4·8
Chamber of Deputies, Paris	...	—	25·0
Theatres (London)	7·6	32·0	14·9
,, (Manchester)	10·2	27·3	14·8
,, (Paris)	23·0	43·0	33·0
3. *Dwelling-houses by day:*—			
	5·4	12·7	7·8
4. *Dwelling-houses by night:*—			
In a study near table	—	—	11·8
,, near ceiling	—	—	15·6
Bedroom at night	—	—	28·0
,, window open	—	—	8·0
5. *Dormitories:*—			
At Salpetrière	—	—	80·0
Another at ditto	—	—	58·0
Workhouse ward	—	—	125·0
Lodging-house in City	—	—	100·0
6. *Schools by day:*—			
Various in France	27·0	47·0	36·0
Do. in Germany	20·0	56·0	39·2
Do. in England	9·7	31·0	21·5
7. *Mills and Workshops:*—			
	28·3	30·0	29·1
8. *Barracks at Night:*—			
	11·9	14·2	12·8
10. *Cornish Mines:*—			
Good	—	—	8·0
Bad	—	—	190·9
11. *In expired Breath:*—			
	350·0	500·0	452·0
12. *In room with chafing-dish:*—			
	—	—	1,400·0

the fire in such a condition that it may be easily revived at either end of the journey.

The evolution of the products of combustion is thus almost entirely confined to that portion of the journey when the trains are passing through the open spaces.

The coke is of a superior quality, being made from a coal which is known to be more than usually free from iron pyrites, and it is burnt in the ovens for twenty-four hours longer than the ordinary coke generally used upon railways. In addition to which a staff of eight men and a foreman are constantly employed in examining and selecting the coke, so as to ensure that none but the best quality of coke is transmitted to London for the use of the Underground Railway.

To determine the per-centage of sulphur in the coke, thirteen samples were submitted to chemical analysis, and these gave an average proportion of 0·26 per cent. of sulphur, which is about one-fourth the quantity found in ordinary coke. As regards the coke, therefore, we see nothing to which we can take exception, but, on the contrary, we are of opinion that the best available means are used for obtaining a fuel as free from deleterious matter as possible, in addition to which the combustion of the same is conducted with the view of preventing as far as possible the escape of offensive gases.

The presence of sulphur, or, more correctly speaking, of sulphurous-acid gas, in the tunnels and stations, which at times is appreciable both to taste and smell, more particularly on those days when the external atmosphere is unusually dense, must not be taken as an indication that this gas exists in dangerous quantities, for as little as one part of this gas in 100,000 parts of atmospheric air is strongly perceptible both to taste and smell; and paper moistened with a solution of iodic acid and starch becomes tinged with a blue colour when exposed for a few minutes to air having the above proportion of sulphurous acid. On several occasions we have exposed this delicate test to the air in the tunnels while passing through them, both in the carriages and on the engines; and, although the quantity of air thus brought into contact with the test has been considerable, yet it has only been during the time of active traffic that the test has shown the presence of sulphurous acid, and then in an insignificant degree. In addition to the above, we beg to point out another cause which communicates to the air, more particularly in the stations, a pungent smell, which, although disagreeable, cannot in the slightest degree be regarded as injurious to health; we allude to the partial combustion of the wood forming the breaks when acting upon the tires of the wheels in checking the speed of the train as it approaches the stations.

The number of trips made by the trains through the tunnels daily amounts to 358, of which 284 are by the narrow-gauge trains, and 74 by the broad-gauge. Each of the narrow-gauge trains occupies 20,000 cubic feet of space, and those of the broad-gauge 23,000 cubic feet. The length of time occupied by each train in passing through the tunnels and stations is ten minutes. There are numerous openings communicating with the external atmosphere above, amounting in the aggregate to 3,164 square feet, and distributed in the following manner: namely, Baker-street station, 1,362 square feet; Portland-road station, 863 square feet; Gower-street station, 939 square feet. The western end of the tunnel at Edgware road opens into a large area called the Yard, and, at the eastern end of the tunnel at King's-cross an opening has been made directly into the atmosphere, 40 feet in width, in addition. By an extensive series of thermometric observations we find that there is an average difference of about 1·7° Fahrenheit between the temperature of the tunnels and that of the external atmosphere; the mean outside temperature being 70° Fahrenheit, while the air in the tunnels had a mean temperature of 68·3° Fahrenheit, so that it was 1·7° Fahrenheit colder than the external atmosphere. During the winter months this condition will possibly be reversed; but in either case there will be a rapid change of air by an ascending and descending current. Having regard to the cubical volume of the trains, the short time occupied by them in passing through the tunnels and stations, the large volume of air which they displace, and the increased impetus given to the horizontal movement of the air by the rapidity of the transit, we are of opinion that the vitiation of the atmosphere cannot be of a serious character, and this accords with the results of our analysis.

A careful inspection of the tunnels has also shown that they are well constructed, and are generally dry and free from infiltration of liquid or other matter prejudicial to health, with the exception of a portion of the tunnel between Portland-road and Gower-street; to this we directed the attention of Mr. Fenton immediately after our first inspection; and we are happy to be able to add that the defect was at once attended to, and is now in a perfect sanitary condition.

We find on inquiry that the general health of the *employés* is such as to afford unquestionable proof of the sanitary condition of the air in the tunnels. From a statement furnished to us by Mr. Fenton, it appears that the per-centage of sickness and mortality of these persons is considerably less than that of the *employés* on the Great Western Railway. To this fact we may add the results of our own personal inquiries, which fully confirm it, as many of the engine-drivers and guards have, we find, been in the service of the company since the opening of the line. They are, to all external appearance, robust, healthy men, and they have assured us that since they were first appointed they have scarcely had a day's illness.

From the foregoing facts, we are enabled confidently to state that the atmosphere of the Metropolitan Railway is not unwholesome or injurious to health.

(Signed)

Geo. H. Bachhoffner, Ph.D., F.C.S., &c.

Hy. Letheby, M.B., M.A., &c., Professor of Chemistry in the College of the London Hospital, and Medical Officer of Health for the City of London.

J. Whitmore, M.D., &c., Medical Officer of Health, and Chemical Examiner of Gas for the Parish of St. Marylebone.

It may be mentioned that the jury, without hesitation, found a verdict of "Died from natural causes."

PARIS EXHIBITION.

The absolute closing of the Exhibition was officially announced for the day originally fixed, namely, the 31st of October, and the numbers present during the last three days of the month, and especially on the 30th, were enormous. According to some accounts two hundred thousand passed the wickets on that day, but this is probably an exaggeration; a large proportion consisted of the children of the common schools of Paris, whose admission was paid for by the society which was formed for the special purpose of aiding the working classes to visit the Exhibition. On the morning of the 31st Oct. there appeared a notice, signed by the Prefect of Police, stating that the Exhibition would remain open three days longer, the rate of admission remaining the same, all gratuitous cards being suspended, and the net proceeds being devoted to public charity. The change thus made at the last moment was unfortunate; the foreign commissioners and exhibitors found their arrangements interfered with, and consented to the delay very unwillingly. The result affords an additional argument for absolute exactitude in carrying out the original plan in all such undertakings. The time has turned out peculiarly unfavourable to the project of aiding the charity funds. The 1st of November being a strict religious *fête* (*Toussaint*) the schools were absent, and the following day being that upon which all Paris visits the

last resting-places of relatives and friends, the Exhibition was almost a desert. Moreover, the gallery of the Histoire de Travail was closed, and many exhibitors had already packed up their goods. We are not yet aware what was the attendance on Sunday, but probably it will have been large, as by that time the people would be all aware of the change made with respect to the closing. There is still a rumour afloat that the Exhibition may yet remain open for some days longer, perhaps at a reduced rate of charge; but the authorities are said to have absolutely decided against gratuitous admission, on account of the difficulty of controlling such an immense mass of persons as might be expected to attend.

One portion of the Exhibition, the horticultural garden, which will in no way interfere with the business proceedings of the other portion, is to be maintained for a time, but the weather will soon be too ungenial to render promenades there agreeable.

The completion of the list of awards was effected on the 30th of October; this new list includes the horticultural and agricultural classes, the hydraulic and other services of the exhibition itself, and that of the means and processes employed by ouvriers working on their own account. This list is to be immediately printed and published in a provisional form, as the former list has been, but it is announced that, like the first, it may require numerous corrections, so that a perfect list cannot be looked for for some time, as proofs are to be sent to all prize-holders for correction.

The distribution of the medals of the former list is announced to take place as follows:—The gold medals between the 15th and 30th of the present month; the silver during December; and the bronze between the middle of January and the end of February. A diploma will be given with each medal, and those for honourable mention may be expected to be delivered in the month of March.

The catalogue of the retrospective collections appeared only last week, and though it is little more than a bare list of objects, it fills more than 400 pages; it is, however, very incomplete, the contributions of Spain, Portugal, Hungary, Sweden, and the East, not being included. A new and complete edition is promised shortly.

The presentation to the French Society, by the Royal Life-boat Institution, of the fine English boat exhibited here, has produced an admirable effect; the Central Society, which is under the patronage of the Empress, has expressed its hearty thanks for the handsome present, and has ordered the name of the British Institution to be painted on the bows of the life-boat itself and inscribed on the list of benefactors to the French society, and has decided that the boat shall be placed at the Calais station as proposed by the donors.

Experiments were made in the artillery practising ground, at Vincennes, the other day, with the life-line apparatus exhibited by the Bremen Society for Saving Life from Shipwreck; the trials were conducted by French and Prussian officers, and the report is highly commendatory. The arms used to throw the line are reported to have a range of 400 mètres, and to act with very satisfactory precision.

Commerce.

The Silk Trade and the French Treaty.—At a meeting of the Macclesfield Chamber of Commerce on Monday last the deputation who recently waited upon Lord Stanley presented a report of the statements which they submitted on the effects of the French treaty upon the silk trade. From this it appears that their plea on behalf of the English manufacturers was that their interests, and the interests of the large number of persons employed by them, were not fully considered when the French treaty was made, since, notwithstanding the enormous advantages which the French silk manufacturers were given by the total freedom from duty on silk goods exported to England, the French Government insisted upon retaining duties which were then imposed, and still continued, on certain goods made of silk in this country, and in which England might have stood a fair chance of competing with French manufacturers. Apart from the distress experienced in Spitalfields, the following towns were named as having severely suffered:—Manchester, Derby, Macclesfield, Coventry, Nottingham, Congleton, Leek, and Sandbach. In Macclesfield, in 1859, before the treaty, there were 55 factories, employing 14,000 people; and these have been reduced to 31 factories, employing 5,000 people. There are 2,000 empty houses in the town, or 20 per cent. of the whole, and the sufferings of the workpeople continue to be very great.

Colonies.

Railways in Victoria.—A statement of the revenue and expenditure on the Victorian Government Railways for the half year ending 30th June, 1867, has been presented to Parliament, from which it appears that the total mileage of the passenger and goods trains was 555,654 miles. The total revenue was £258,960, and the expenditure £131,908, leaving a balance for profit of £127,051. The following are some of the principal items of expenditure:—Locomotives, £49,585; maintenance of permanent way and works, £24,789; passenger and goods traffic and general charges, £57,533. The cost per train per mile was 4s. 8d. The number of passengers was 567,898, paying £104,056. The quantity of goods conveyed was 182,257 tons, realising for carriage £135,802, and £4,840 was received for live stock.

The Effects of the Drought in South Australia.—It appears that at the close of the year 1863, there were 3,891,600 sheep in the colony, and at the close of 1866 there were 3,911,000, being an increase of only 20,000 in three years, or about ½ per cent., whereas the rate of increase for the years 1861 and 1862 was 12½ per cent. per annum. The cattle returns show even a more disastrous result than the sheep; the total number at the close of 1863 was 226,100, and at the close of 1866 their number had been reduced to 123,800. The above returns would be slightly modified by the imports and exports of stock, but it would not materially affect the above result.

Revenue of Victoria.—The following statement shows the net revenue of the colony of Victoria for the year ended June 3rd, 1867, compared with that of 1866:—

	1866.	1867.
Customs	£1,257,848	£1,160,237
Excise	47,357	48,732
Territorial	773,658	854,743
Public Works	666,469	645,940
Ports and Harbours	18,244	17,661
Fines and Fees	97,563	73,151
Postages	137,801	110,787
Miscellaneous	43,120	44,192
	£3,042,060	£2,955,443

Queensland.—The cotton crop of last season, under very considerable disadvantages, was such as to induce a much larger cultivation in the coming one. Some speak of four times the growth, some more than that; but all agree that the yield of 1866-7 has been such as to justify an enormous increase in 1867-8.

Obituary.

Elias Howe, jun., the inventor of the sewing machine, died on the 3rd of October, in the 48th year of his age, at Bridgport, Connecticut. He was born in 1810, at Spencer, in Massachusetts. At the age of sixteen, he went to work in a manufactory of machinery in Lowell. At the age of seventeen, the closing of the

mills in Lowell sent him adrift, and he afterwards found work in a shop in Cambridge, where he was companion with his cousin, Nathaniel P. Banks, since Governor of Massachusetts, Speaker of the House of Representatives, and Major-General. From Cambridge, he went to Boston, and worked in the shop of Ari Davis, where he first thought of the sewing machine. In April, 1845, he sewed a seam with his machine, and in May of the same year he had completed his work. He procured his patent in 1847. Meeting with little success he went to England, but could accomplish nothing there, and returned to America a poor man in 1849. It was not until 1854 that his machine became a success, and down to that time 8,000 had been manufactured. Now there are scores of different kinds of machines made in America, and during the year ending with June last no less than 170,105 were made in the United States. Mr. Howe at the time of his death received a royalty for every machine manufactured, and the aggregate royalties paid him have amounted to more than 2,000,000 dols.

Notes.

Educational Congress.—The congress appointed to be held at Birmingham on Wednesday, 13th inst., under the direction of the General Committee of the Scholastic Registration Association, will meet in the Midland Institute at eleven o'clock, a.m.; the Rev. J. D. Collis, D.D., F.C.P., Head Master of the Bromsgrove Grammar School, will preside. No alteration has been made in the subjects for discussion, which are as follows:—1. How far will the proposed Scholastic Registration Act tend to raise the Standard of Education throughout the country, and promote the interests and efficiency of the Scholastic profession? 2. How far is the Science of Education capable of development in this country by the more specific training of educators, and by such measures as the institution of a special faculty of Education in the Universities of Great Britain and Ireland? 3. What means can be adopted for training teachers for Upper and Middle Class Schools? Further particulars may be obtained from the Hon. Secretary, Barrow Rule, Esq., Aldershot, and, on the 12th and 13th November, at the Midland Institute, Birmingham.

MEETINGS FOR THE ENSUING WEEK.

Mon.....R. Geographical, 8½. 1. The President's Opening Remarks. 2. Mr. C. R. Markham, "Portuguese Expeditions to Abyssinia."

Tues ...Ethnological, 8. "The Ethnology of Abyssinia, from the Report of Consul Plowden, with Observations by Mr. John Crawfurd."

Civil Engineers, 8. Discussion upon Mr. Byrne's paper, "Experiments on the Removal of Organic and Inorganic Substances in Water."

Thur ...Zoological, 8.

Patents.

From Commissioners of Patents' Journal, November 1st.

Grants of Provisional Protection.

Anvils—2924—H. Sharp and F. W. Webb.
Boilers and furnaces—2920—W. Tredgold and J. McNeil.
Bonnets, &c.—2936—C. Montagu.
Boots and shoes—2917—G. M. Wells.
Bottles, &c.—2959—H. Hughes.
Bottles, &c., stoppers for—2922—F. Prudencio, F. Cooper, and J. F. Cotterell.
Bottles, &c., stoppers for—2943—L. Newton and J. Swailes.
Boxes, dredging and spice—2971—A. V. Newton.
Carriages, applying wheels to—2967—G. Jones.
Casks, cleansing—2906—J. Oxley.
Chairs—2902—C. Tinet.
Churns—2940—W. Liebermann.
Closets, &c., deodorizing dry—2918—J. Bannehr.
Conveyances, disconnecting from animals—2797—R. Ellis.
Cooking by means of gas—2931—H. J. Bale.
Cotton, &c., machinery for preparing—2947—E. Butterworth.
Excavating apparatus—2826—J. B. Hulme.
Fabrics, machinery for clipping certain—2914—L. Hamel.
Felts—2946—J. Anderson.
Fire-arms and cartridges—2923—H. W. Garrett and G. Holcroft.
Fire-arms, breech-loading—2941—W. R. Lake.
Fire-arms, breech-loading—2961—J. Adams.
Fulling machines—2903—E. Gessner.
Furnaces—2953—W. Barrett and C. Martin.
Gas—2893—A. Aitchison.
Gauges, &c., preventing the bursting of—2925—E. Casper.
Hoes—2945—F. Adkins.
Horse shoes, &c.—2965—P. and A. Walker.
Leather, pressed—2977—F. J. Bugg.
Legs, artificial—2957—A. H. Brandon.
Letter-boxes, &c.—2948—M. W. Shove.
Limb fractures, treating—2979—C. S. Jeaffreson.
Looms—2951—M. B. Nairn.
Manure, disinfecting—2549—F. Tolhausen.
Metals, glass, &c., casting—2912—J. Rives.
Mining machines, cages used in—2934—J. King.
Motive-power—2899—A. M. Clark.
Muffs, &c.—2892—M. Vogl and H. V. Dyk.
Needles, threading—2891—H. A. Bonneville.
Ornaments for dresses, &c.—2950—H. Hughes.
Paper—2715—J. Jameson.
Paper, &c., cutting—2911—R. C. Ross.
Perambulators, &c., hoods for—2910—E. Shaw.
Pianofortes—2939—M. J. Matthews.
Projectile dischargers—2949—R. Watkins.
Pulverizers—2975—C. D. Abel.
Railway signals—2908—M. Wilkin and J. Clark.
Railways, &c.—2896—W. R. Lake.
Rollers—2901—F. D. Frost.
Saddles, pack—2897—H. A. Leveson.
Sewage, distributing—2898—B. Latham.
Sewage, treating—2894—T. H. Baker and T. Woodroffe.
Sewing machines—2867—H. B. Barlow.
Sewing machines—2895—M. Samuelson.
Shuttle eye—2928—W. H. Tasker.
Ships' davits—2937—M. Alex.
Steam, superheating—2890—H. A. Bonneville.
Telegraphic cables, &c.—2942—A. F. Jaloureau and C. L. Lardy.
Telegraphic communication by pneumatic means—2900—A. and A. C. M. Prince.
Telescopic apparatus—2969—W. Beale.
Watches—1844—J. Wilkinson and W. Grimshaw.
Water, refrigerating—2944—J. Schwartz.
Wells, sinking—2981—J. L. Norton.

Inventions with Complete Specifications Filed.

Publicity, &c., obtaining—3008—A. M. Clark.
Centrifugal pumps—3041—W. R. Lake.

Patents Sealed.

1273. J. and J. Lomax.
1286. J. Stuart and J. H. Smith.
1287. W. R. Lake.
1293. E. Krieghoff.
1298. S. Thacker.
1303. C. B. Reitz.
1306. J. Thèvenet.
1307. L. Delperdange.
1308. J. H. Johnson.
1309. E. Leigh.
1311. T. W. Bunning and W. Cochrane.
1313. N. M. Shafer.
1321. J. Ball.
1361. T. J. Mayall.
1389. J. Johnson and A. Giles.
1392. W. Smyth.
1507. W. Nichols, J. Burnley, T. Wilson, and G. Jackson.
1510. S. H. Foster & T. Bunney.
1517. D. Adamson.
1573. F. J. Vandenvinne.
1678. W. W. and J. Wood.
1728. A. M. Clark.

From Commissioners of Patents' Journal, November 5th.

Patents Sealed.

1317. W. Bradbury.
1323. R. Taylor and E. Poulson.
1326. W. R. Lake.
1328. G. Wilson.
1334. J. S. Cavell.
1344. C. Burrell.
1348. N. W. Wheeler.
1349. N. W. Wheeler.
1350. N. W. Wheeler.
1351. N. W. Wheeler.
1354. J. and A. Fairley.
1357. J. Gaskell.
1358. W. R. Lake.
1359. J. Nixon and J. Winterbottom.
1360. T. A. Weston.
1362. H. R. Cottam.
1363. G. E. Donisthorpe.
1364. H. R. Cottam.
1369. T. A. Weston.
1373. T. A. Weston.
1376. A. Herce.
1381. G. Jeffries.
1382. G. McKenzie.
1385. R. Mellard.
1386. J. Norman & W. H. Miller.
1391. J. Combe.
1402. T. Nelson.
1417. J. W. Butler.
1422. A. H. Colles.
1468. E. Webb.
1506. G. Hurdman.
2073. T. Wrigley.

Patents on which the Stamp Duty of £50 has been Paid.

2707. G. Ashcroft.
2887. W. Wilson.
788. R. A. Brooman.
2688. C. O. Crosby.
2695. J. F. Brinjes.
2896. J. Baston, jun.
2735. H. A. Gwynne.
2720. E. T. Hughes.
2745. H. V. Scattergood.
3006. W. Clark.

Patents on which the Stamp Duty of £100 has been Paid.

2717. W. Hewitt.
2904. I. Sharp and W. Bulmer.
2723. J. Higgins and T. S. Whitworth.

Journal of the Society of Arts.

FRIDAY, NOVEMBER 15, 1867.

Announcements by the Council.

Notice to Members.

The One-Hundred-and-Fourteenth Session of the Society will commence on Wednesday next, the 20th instant, when the Opening Address will be delivered by William Hawes, Esq., F.G.S., Chairman of the Council.

The following are the dates of the Wednesday evening meetings, the chair being taken at 8 o'clock:—

1867.	November	—	—	20	27	
„	December	4	11	18	—	
1868.	January	—	—	15	22	29
„	February	5	12	19	26	
„	March	4	11	18	25	
„	April	1	—	15	22	29
„	May	6	13	20	27	
„	June	—	—	—	24*	

For the Meetings previous to Christmas, the following arrangements have been made:—

November 20.—Opening Address by Wm. Hawes, Esq., F.G.S., Chairman of the Council.

November 27.—"On the Diplomatic and other Conferences held recently in Paris with reference to International Coinage, Weights, and Measures." By Leone Levi, Esq., Professor of Commercial Law in King's College, London.

December 4.—"On the Relation between Health and Wages." By J. H. Stallard, Esq., M.D.

December 11.—"On Industrial and Scientific Education; with Notes on the Systems pursued, and the Works produced, in Continental Schools, as exemplified in the Paris Exhibition, and Suggestions for the Establishment of Trade Schools in England." By Ellis A. Davidson, Esq.

December 18.—"On the Principles that Govern the Future Development of the Marine Boiler, Engine, and Screw Propeller." By N. P. Burgh, Esq., C.E.

A book of blank Tickets of Admission to the Meetings has been forwarded to each Member, who is privileged to introduce two friends to each Meeting, on their presenting orders signed by him. Additional Tickets will be sent on application.

The first course of Cantor Lectures for the ensuing Session will be on some branch of Chemistry applied to the Arts, by Dr. F. Crace Calvert, F.R.S., and will be delivered in the early part of the Session; the second course will be "On Food," by Dr. Letheby, Medical Officer of Health for the City of London. A third course will be given, the arrangements for which are in progress. Further particulars will be published in the *Journal*. These Lectures are open to Members, each of whom has the privilege of introducing one Friend to each Lecture.

Members are reminded that, should any of their friends be willing to join the Society, the opening of the Session is a favourable opportunity for proposing them.

The following Institution has been received into Union since the last announcement:—

Rugby, Evening Classes for Young Women.

* The Annual General Meeting: the Chair will be taken at Four o'clock. No Visitors are admitted to this Meeting.

Proceedings of the Society.

Food Committee.

A meeting of the committee took place on Saturday, the 9th instant, at 10·30. Present—Mr. Benjamin Shaw, in the chair; Sir W. H. Bodkin; Messrs. Harry Chester, Rev. J. G. Fussell, Rev. Douglas Tinling, Edw. Wilson, James Ware, and W. H. Michael.

Messrs. Sorensen and Plahte showed a Norwegian cooking apparatus, of which a description has already appeared in the *Journal*.* The apparatus shown consisted of a stewpan fitting into a box lined with thick felt. A trial was made of the apparatus; a leg of mutton, with vegetables, was placed in the stewpan, boiled for five minutes, and then carefully enclosed in the box, and the lid sealed. When opened, at the expiration of 3¼ hours, the whole was found to be perfectly cooked; the temperature of the water being then about 160 degrees Fahrenheit.

Mr. W. Riddle, C.E., attended the committee, and explained a plan for supplying dinners to families ready cooked and hot. He laid before the committee the following statement:—

Gentlemen,—To say that a large part of our system of food supply is founded on a cardinal blunder, seems to be to charge the community with a want of common sense, and yet what other conclusion can be come to when we consider how true is Soyer's remark that half the food of the people is wasted, that ten times the necessary fuel is used in its preparation, and that the result is a lamentable failure for want of knowledge and fitness of means and things to the end to be accomplished.

It is especially with regard to the one great meal of the day that the above thoughts apply.

Large classes of the people (apart from the question of money) find great difficulty in providing dinners and getting anything like value for their money. This evil might be vastly ameliorated under a system of commissariat more in accord with economical principles. Take an illustration. In many families, in cities—families of small incomes—the mother is occupied all day in a small shop; she has, besides this, some of her children to attend to, and so at one or two o'clock, in thousands of houses, but meagre fare is seen on the dinner table—out of proportion to the money expended—for it has been ill-spent, and the food ill-cooked. The statement of the special correspondent of the *Daily Telegraph*, that at Glasgow he had a capital dinner of good pea soup, boiled beef, 10oz. potatoes, and pudding—more than he could eat—for, in all, the sum of 5½d., shows what may be done.

It is desirable to lessen the wear and tear of the present system of dinner-getting in these households. The mother—for we will suppose the husband has

* Present vol., p. 664, under the heading "Paris Exhibition."

duties away from home—is frequently obliged to go out in all weathers and use what little skill she may have in buying; she has to see that her servant keeps a proper fire—or, perhaps, she has no servant—and then there is the cooking. Valuable time is thus expended—often extending over hours—which might be spent in earning money; and children are neglected at a time of life when they most require watching.

If we could send round to these thousands of families, and those even of a better grade, dinners ready prepared, and at the lowest remunerative rate, we should open the way to a great deal of good. Buying on a large scale, with experienced buyers, and in the cheapest markets, and wasting nothing because of the magnitude of the operations, we could afford to supply at a very cheap rate. We should want horses, but at Glasgow they require dining-rooms, condiments, table-cloths, cutlery, and waiters.

The waste in small families is (in the aggregate) enormous. A little lemon-peel is wanted, and so an entire lemon is purchased; a little of everything, all of which is not used. They have to encounter adulteration, and fraudulent weights and measures. Day after day the cold joint makes its appearance, and if it is considered economical, it is only so because the family eat cold meat very sparingly, for few people in our London atmosphere and life have the strength to get on with it. One-half the confined boxes called safes, situated close to water-closets and drains at the backs of small houses, are not fit for storing cold joints and other food. Many people have no safes at all. The husband often goes out or stays out, and dines elsewhere, reducing the allowance that can be made for the family dinner, but he says he must keep up his strength. Many a man paying 2s. for his steak and stout in the City, would rather put the 2s. to the family dinner, if such a thing was to be got; but, on the tables of the classes I refer to, Sunday only is the day when a hot dinner of average goodness is seen, and this because of the trouble (in one way or other) of getting it. Or, if the husband gets a holiday and dines at home, he finds that the wife is knocked up and ill, red in the face and cross with her labours, and with no strength nor appetite by the time she has prepared the dinner, which in most cases she cannot trust her one maid to get ready.

Perhaps the one drudge sends up the dearly-purchased joint with half the gravy missing. A little reflection will show the waste, loss of time, vexation, hurry, confusion, bell-ringing of greengrocer, butcher, and others, consequent on the dinner that must be got somehow. The poor professional engraver, artist, draughtsman, copyist—has all the children on his hands,—in his room, because the mistress and her servant are busy as Macbeth's witches (in the kitchen) over the cauldron. This breaks his labours for the day, and has been the ruin of families.

"For want of a nail the shoe was lost."

It is proposed, then, to try and remedy this in a very obvious manner, viz., to cook plain food on a large scale by some one of the fuel-saving apparatus, now well understood. With a tithe of the coal now used in ordinary kitchens, we have seen (thanks to Mr. George Warriner, late Instructor in Cookery at Aldershott), dinners for 2,500 men prepared in—not baking, but roasting-ovens, at the Tower o London. The cleanliness and excellence of the result seemed to leave nothing to be desired.

We propose by some such apparatus to roast, boil, and bake—meat, vegetables, and puddings of a plain description,—to have the meat carved from the joints by fair and skilful carvers,—to have it weighed by assistants alongside, by porcelain-fitted weighing apparatus, and then placed, with gravy, in say 2 lb., 4 lb., and 6 lb. tin cases (lined with pure tin), or in covered cylindrical jars. These covered jars (or cylinders), or tinned vessels, are at once to be placed hot, in hot japanned-iron cases, or cupboards, mounted on a tramway in a room. These cases to be four or five feet square, and about two feet six inches high. Each of these large cases forms the separated interior of a cart, about the size of an ordinary Parcels Delivery cart, if that is a convenient size. Loaded in a room of high temperature, with jars or canisters of food at 212°, they are then slid along the tramway-bench into the cart itself,—sliding into the cart just as a drawer is passed into a chest of drawers, only that the japanned iron case is open from the back, like the so-called "pigeon-hole" furniture, used for letters and documents. The cart into which the said iron case is slid, may be of wood lined with felt. The horse and cart are backed up to the tramway, and attached to the tramway by a bolt while this is being done. The carts thus loaded, and closed behind by a panel in which are as many doors as there are compartments, is now driven off to deliver the goods. Note,—that by having separate doors in the back part of our cart, we shall never expose all the compartments of jars to the cold air at one time. The hind panel of the cart, with its doors, would be felt-packed. The driver is in front. The conductor stands behind, and has with him, hanging on the rear of his cart in a weather-proof cover, and arranged in order by the office clerks, the lists or forms of the addresses of customers, and specifying the things to be delivered at each house. These forms he compares with the tickets given up by the house occupiers when the food is delivered to them.

The tickets (held by the public) are previously purchased from agents selected from tradespeople of the respective neighbourhoods, just as district offices are selected by the Parcels Delivery Company.

These tickets might be in printed form, in books about fourteen inches long and five inches wide; each page divided into three similar forms; each form to contain a printed list of food supplied, with number, date, room for the address of purchaser, agent's name, and ruled-off spaces which only require to be filled up with figures at the time of ordering, under suitable headings of each size of canister or jar. (See form annexed.) It gives a rough idea of the principle.)

To the Head-quarters, Moorgate-street, of the Hot Provisions Delivery Company.

Order taken Nov. 14, 1867.

FARE FOR CHOICE.	Cases.		
	2 lb.	4 lb.	6 lb.
Roast beef	1		
Mutton		1	1
Potatoes	1	1	
Greens	1	1	
Plum pudding			1
Rice		1	

Number 147.
Office 11.

Please deliver the above to
Mr. S. Smith,
10, Guildford-street.

To be delivered
Nov. 18th, 1867.

John Giles, agent,
West-street.

The agent fills in the figures, address of buyer, dates, and signature. Probably he will not be allowed to sell less than six tickets. Each page of his printed book is a ticket. One-third is given to the buyer, one-third is sent to head-quarters, and one-third remains in the agent's book. In taking six tickets, then, it will be seen that the thirds of six pages are given to the buyer. If all the six dinners (or any number) ordered are alike, the first ticket only need be filled in in full by the agent. The buyer of the tickets will give them up

day by day to the conductors of the carts (when they call with the food), who will file them on a file on the top of his cart, and under shelter. He will return them at head-quarters as vouchers of delivery. The portion of the page of the book sent to head-quarters by the district agents will enable the secretary's clerks to compile the demands on the commissariat stores, and the kitchen generally.

This system might be much improved.

The kitchen superintendent will receive draught-lists, and will get his clerks to fill up printed draughts on the purveyors of the raw material—uncooked provisions. There will be check and counter-check, to ensure precision; and, indeed, I may suggest that a military sort of exactness, trim, and fitness of apparatus, cleanliness and neatness throughout, will be indispensable, and is easy if rules are rigidly laid down at first.

It is recommended that the buyers of dinner tickets be furnished by the district agents with boxes on the Swedish caloric retaining principle, into which the jars, when delivered from the carts, can be at once placed. Felt is about a penny or three half-pence a foot. It is alleged that in these wadded cases the food will keep hot for hours. Even one of the tea-pot covers recently introduced might suffice.

Any number of hot cases, or closets, might be filled with jars, despatched in a large, closed, furniture sort of van, with despatch across the metropolis, and then shifted from it and mounted on cart frames with the horses attached, miles away from the kitchens.

'Returned empties' may be called for each morning by carts, passed into the scalding-room, inverted, and placed on drainers.

The carving, weighing, and filling-in room may have wooden racks, in which, early each morning, shall be placed the jars or canisters only of the particular days' issue, according to the lists furnished by a clerk.

The puddings may be mixed by machine.

The building in which these several operations of storing, trimming, cooking, carving, and issue would take place, with the requisite offices, should, by preference, be a long structure, glazed in one wall from one end to the other, so that the public might freely inspect what was going on. Under restrictions, they should have free access to see, and to get information. Sausages would be eaten by people who never touch them, if they knew all about them, and had no reason to doubt. We are left in doubt about Dorset butter, now that the *Times'* correspondent says it is rancid butter mitigated by hog's lard. Is all the fruit sound used in the jam trade? Is mineral acid used for pickling? Is beer from the tavern pure? Is cheese reddened by carrot, and gin enlivened by cayenne? Not a tenth of the mustard sold is pure, I have excellent reason to believe. Would not such a project as this, if open as the day (as all things ought to be), assist in the health of the people? Many servants—this *en passant*—are not over clean. On a large scale of our operations cleanliness could be insured. At the risk of being prolix I will say that there is no reason why a factory of the sort our building should be, should not be as clean as a man-of-war. The public, our customers, would have a right to see, and unless they did so we should not soon get their confidence.

The remains of provisions might be sold to the soup-kitchens of the poor, or, if it could be afforded, it might well be a donation for this purpose.

It is believed that if this undertaking were carried out in a respectable manner, and on a sufficient scale, great public economy of fuel and of food would be the result. But, if time is money, there would be a saving in money in thousands of households, for the better education, nursing, or general care of children, time to take them out for air and exercise, which London children don't get enough of, time for duties of washing, mending, clothes-making, sewing-machine work, and self-culture or relaxation.

If this project is executed, may we most confidently predict that many houses will be rendered happier, healthier, and morally better?

The project could not be kept too simple at first. The Glasgow system is a paying system. The good it must do is immense. Doubtless, at Glasgow, a great deal may be learnt in furtherance of this project, but I would at first be content with a much less variety of food for this project than is given there, or it might not pay.

I have had much to do practically with manufactories and processes, and a very slight alteration, I need hardly say, will sometimes require expenses and alterations all the way through an elaborate organization, even to the printing.

But, simply as we might commence, I see no reason why, eventually, a sort of portable (mobilised) civil commissariat should not become an institution of the country (and a better one than "Watling's Pork-pies," though that is good), even to feeding volunteers on distant review-fields, or gangs of thousands of sturdy navvies, with the aliment which is their strength.

Eventually, we might hope that soup might be provided for the poor, and delivered in the poorest districts in common earthern jars carried in carts; and the system of what I have (perhaps erroneously) denominated "civil commissiarat" might extend upwards, so that at one-half Ring and Brymer's or Gunter's prices elaborate dishes of French or other cookery might find a large sale—the demand arising from the reduction of price, and the public becoming used to our system.

To go to the other end of the scale, one word about the very poor. In the depth of winter in London, as early as the dawn, I think it would be a great boon if oatmeal porridge could be delivered to the poor for a little over cost price. The bread and rank butter, and the chicory mixture, called coffee, sold at the stalls, is not a comforting meal compared with porridge made of Scotch coarse oatmeal, milk, water, and molasses, or coarse sugar. The porridge can be made in ten minutes. Children devour it with avidity. In the casual wards it is preferred—according to the testimony of the newspapers. Seven pounds of oatmeal cost about a shilling, and, with the other ingredients, hot penny rations might be sold, for the want of which hot meal thousands sink under calamity. Peas soup is an excellent thing, but hardly a suitable meal to begin a day on, and especially for those suffering from extreme debility and disease, and who are not so much less human than ourselves as some of us seem to imagine.

I will conclude this with one remark, which must be obvious in its truth:—if we wish in these troubled times to prevent political agitation on the part of the people—the great *unfed* as well as the great *unwashed*—we cannot do better than assist them to hot food with the money they earn. Millions of people are almost homeless. There are other Arabs than those of the sandy desert. To feed the people wisely is a matter worthy of Reformers who wish to promote content. A man, like a hungry child, will not cry out when he is filled. To feed the people is to promote good government and the cause of Order.—I am, &c., W. Riddle.

10, Larkhall-lane, S., November 9th, 1867.

PARIS EXHIBITION.

Now that the Exhibition is closed, and the general results are pretty well known, it is natural that comparisons should be made between this and the former universal exhibition held in Paris; from such a comparative report, which, though not official, is, we believe, correct, we extract the following memoranda:—

The Exhibition of 1855 occupied 152,052 square mètres of space, of which 18,726 were uncovered; the number of exhibitors amounted to 2,175 in fine arts, and 21,779 in agriculture and manufactures; the value of the entire contents of the Exhibition was estimated at 75,000,000 francs (£3,000,000); the expenses amounted to 11,336,522

francs, and the sum received for tickets and admissions to 3,202,485 francs.

The space occupied by the Exhibition of 1867, not including the annex of Billancourt, was forty-four hectares, equal to about 110 English acres, of which the main building covered 148,990 square mètres, or very nearly as much as the whole of the ground covered by the former Exhibition and its annexes; the number of exhibitors was double that of 1855, including 3,721 in the fine art sections alone. The expenses are taken at the original estimate of twenty millions of francs (£800,000), and the receipts at half that sum. It may be mentioned that the means for carrying out the Exhibition were subscribed in the following manner:—Six millions of francs by the government, six millions by the state, and eight millions guaranteed by an association, whose subscriptions are said to have amounted to more than ten millions. The total number of persons, French and foreign, who visited the Exhibition, is stated at twelve millions, but as it was quite impossible to tell how many visits each person made, this total, if correct, must represent not the actual number of persons but of visits to the Exhibition.

According to report, there is a considerable balance in favour of the account of the Exhibition, but as several claims are yet undecided, the announcement of any positive sum must, at least, be premature.

PARIS CENTRAL SCHOOL OF ARCHITECTURE.

This is the youngest of the new schools established in Paris for technical education; it was opened in November, 1865. It was founded by a society, under the new law of limited responsibility, with a capital equivalent to the sum of £16,000, and therefore, although having the support of the Ministers of Public Instruction and of the Beaux Arts and other authorities, is, in fact, a private institution. The school is situated in the Rue d'Enfer, in what was formerly the Hôtel de Chaulnes. The number of pupils admitted at the opening was 54, and in consequence, apparently, of the greater strictness exercised, the number was not increased in the following year; the third session commenced with 78 pupils.

The following extracts from the printed *Programme des conditions* will indicate the constitution and system of the establishment:—

"The school is open to foreigners as well as natives. The fee for the annual course is 850 francs (£34), payable in three instalments, namely, 400 fr. on admission, 225 fr. on the 10th of February, and the remainder on the 10th of May following. In addition to this each pupil is bound to deposit 40 fr., to cover any losses or injury occasioned by his fault. The examination for admission may take place, at the desire of the candidate, either at the school itself, in a provincial town, or before a professor of a foreign university. Each pupil must provide himself with drawing instruments, boards, portfolios, and colours. Those pupils who, in the course of instruction, do not exhibit sufficient aptitude or assiduity for success, are not allowed to continue in the school; and during the first year 19 out of the 54 youths admitted were found incompetent.

Candidates for admission, if examined in Paris, are required to send in a drawing of an ornament in bas-relief; the plan, section, and elevation of a building; and a written composition; these are replaced, in the case of provincials or foreigners, by certificates of local architects. In all cases the candidates are examined orally in the following branches of knowledge:—Arithmetic, including fractions, decimals, the metrical system, roots and powers; algebra, including simple equations, negative quantities, the symbols $\frac{o}{o}$, $\infty \times o$, $\frac{m}{o}$, roots and powers of algebraic expressions, radicals of the second degree, and equations of the second degree, and questions relating to compound interest and annuities; geometry, plane and spherical, with problems; trigonometry; descriptive geometry, conic sections, curved surfaces, and plane sections; geography, distribution of sea and land, zones, elements of ethnography, political geography of Asia, explaining the revolutions which have successively changed the geography of China, Tartary, India, the Greek and Mussulman dominations in India, the Assyrian, Persian, Macedonian, Roman, Arab, and Ottoman empires in Western Asia, Phœnicia, Judea, and Egypt; political geography of Europe; revolutions which have changed the distribution of nationalities in the West; maps of Greece and of her colonies in the time of Pericles, of the empire of Alexander, of the Roman empire under Augustus, and of the empire of Charlemagne; Mussulman domination during the khalifat of Cordova; and, lastly, Europe in 1453, 1648, and 1865. In addition to all this those candidates who have already made some progress in architectural studies are invited to submit their drawings or compositions to the examiners, who will take them into consideration as evidence of capacity.

It will be seen that the above requirements are severe, the object of the school being to supply a sound practical training, in place, or rather in aid of, existing institutions, which teach little more than the artistic portion of an architect's education.

The Minister of the Beaux Arts has created four scholarships and four half-scholarships to be competed for by the pupils of the school; the Princess Mathilde and M. Caubert have founded annual prizes, and the ministers, architects, and publishers have made donations of technical publications, which are valued at £340.

During the last session a petition was presented to the Senate in favour of official diplomas for architects; the commission appointed to inquire into the subject decided against the views entertained in the petition, and in favour of the freedom of architecture, and called attention to the new school in the following terms:—"A school bearing the title of the Central School of Architecture was formed two years since; it is based upon the plan of the Central School of Arts and Manufactures, which was created 36 years before, for the training of civil engineers, and which now occupies so important a position in the scientific world. The new school is intended to form architects who study their art in a serious manner, and offers the guarantees which the petitioner asks for.

This school may be said to complete the series of establishments for technical education for which Paris has so long been celebrated.

The inaugural meeting of the session 1867-8 took place on the 11th instant, under the presidency of Henry Cole, Esq., C.B. Mr. Cole attributed the honour which had been conferred upon him, of presiding at the meeting, to the existence of a certain analogy between the Paris School and the Kensington Museum; the latter putting into practice the principles taught at the former. After touching upon the question of construction and ornamentation, Mr. Cole said:—The arrangements of a public museum differ from those of a religious temple, be it Egyptian, Greek, or Roman; they differ from those of a cathedral or church, reformed or not reformed; they are not those of a fortress, of a crenelated tower, of an imperial palace, or of a feudal castle. A museum is a kind of modern socialist building, where the level is the same for all; there is neither dais nor reserved places, and the architecture of past times aids us but little. Mr. Cole then referred to the fact that the specimens in brick and terra-cotta, illustrative of the new buildings at Kensington, lately exhibited in the Champ de Mars, had been presented to the Conservatoire des Arts-et-Metiers, and would be erected in the garden of that establishment. The architecture of our day, said Mr. Cole, is not studied in cloisters, for the erection of cathedrals, fortresses for nobles, or numerous palaces for kings; it is required to supply the wants of a civilized democracy all over the world, and can only make progress by relying on common sense, directed by science and inspired by art;

therefore to this task architecture ought to apply in all humility. Mr. Cole concluded with the announcement that he had asked and obtained permission to offer a prize to be awarded to the most efficient pupil of the school in figure drawing.

COMMERCIAL SCHOOL OF PARIS.

The commercial school, founded by the Chamber of Commerce of Paris, with the aid of the Ministry of Public Instruction, of which the annual distribution of prizes took place not long since, is a novel establishment, which deserves attention. The view of the Council of the Chamber of Commerce in establishing this school is thus expressed in a printed circular:—"Seeing the development of international relations caused by railways, navigation, telegraphic communications, and new treaties, the Chamber felt that it would be well to found a school, in which youths should be prepared for the various careers of commerce." The period of study is fixed at three years, with a fourth year for improvement; and the course comprehends—moral and religious training, the ordinary elements of education, commercial geography and history, technology, book-keeping, exchange, foreign moneys, weights and measures, commercial correspondence, commercial law, the English, German, and Spanish languages, and drawing. The school is open from eight in the morning till five in the evening, and pupils, who are all out-door scholars, are received from the age of twelve years, and after passing a satisfactory examination in elementary education. Lads under twelve may, however, be admitted to a preparatory course of study in the school. Each scholar pays twenty francs (16s.) per month, in advance, which covers all expenses, with the single exception of books. At the end of the third year of study pupils are examined, and, if qualified, receive certificates of capacity; and at the end of the fourth year the Chamber of Commerce delivers diplomas to those scholars who have given proofs, during that year, of real information and solid instruction; so that, in fact, the school awards two grades of degrees. At the late distribution six pupils received diplomas and quitted the school, and eleven others obtained certificates at the expiration of the ordinary course of three years, and a considerable number of prizes were awarded to junior scholars. Amongst the special prizes was the two prix d'honneur, given by the Minister of Public Instruction and the Chamber of Commerce; a third year prize of excellence, and a special prize for book-keeping and accounts, offered by the Chambre Syndicale, of Paris. The number of pupils to whom honours were awarded exceeded thirty, and, considering that the establishment is only five years old, such a result promises well for the school.

Fine Arts.

Additions to the National Gallery. — During the vacation interesting and important additions have been made to our National Gallery. Eleven pictures have been acquired from the private collection of Sir Charles Eastlake, made while he was director of the gallery. One of these, a unique production of an artist known all but exclusively as a medallist, has been generously presented by Lady Eastlake. The valuable picture thus acquired, "St. Anthony and St. George," by Pisano, bears on the frame the following inscription:—"Presented to the National Gallery, August, 1867, by Lady Eastlake, in memory of Sir Charles Eastlake, P.R.A., first director of this Gallery." Pisano was a painter of the Veronese school, and belonging to the first half of the fifteenth century, his style is essentially pre-Raphaelite. The work is delicate in handling as in colour; it is finished as a miniature; gold is used on an embossed surface, as in other pictures by archaic masters of northern Italy. These additions to the gallery belong rather to the early than to the middle or late epochs in Italian art; and they are of special value as giving still greater completeness to our national collection of rare pre-Raphaelite masters, through whom may be traced step by step sustained historic progress in the art of painting. There is a curiously interesting picture by Bono, pupil of the aforesaid Pisano; as late as 1461 this painter was engaged in the Cathedral of Siena, that museum of the middle ages. The subject of the picture is "St. Jerome in the Desert;" in its treatment may be observed a certain German detail, dryness, and literalness, not unfrequently found in the early masters of Northern Italy. The scarce school of Ferrara receives further elucidation in a portrait, striking for individuality, by Giovanui Oriolo. Yet another quattrocento painter of Ferrara, Cosimo Tura, still more amplifies a collection already rich. Mr. Wornum, in his "Epochs," designates Tura as "the Mantegna of Ferrara." The artist succeeded, as court painter, Piero della Francesca, of whom our gallery contains a magnificent example. Tura's "St. Jerome" is hard and dry; the figure, as frequently in these tentative northern schools, suffers as from emaciation of flesh. The second picture by this rare master is among the most attractive of the recent acquisitions; the subject, "The Madonna and Child," has received unusual amplification in a company of saints, playing on violins, &c. We now pass to another school—that of Venice in pre-Titian times. In the Venetian Academy there are few works of more interest, not to say singularity, than those which come from Murano, the island of glass manufacture celebrity. Among the collection in the Venetian Academy may be remembered pictures by Bartolommeo and Antonio Vivarini. Our National Gallery previously possessed a picture by the former; it now receives a production of the other brother, Antonio. In treatment the panel displays the detail, realism, and individual truth which belong to the nascent school of Venice. It is also signalised by the rich harmony of colour which from first to last marks the Venetian manner. In Mr. Wornum's "Epochs" will be found a just estimate of the works of the Brothers Vivarini, the famed painters of Murano. In Mrs. Jameson's "Memoirs of Italian Painters" is found the following passage:—"In the Island of Murano, at Venice, dwelt a family called the Vivarini, who had carried on the art of painting from generation to generation, and who had associated with them some of the early Flemings, thus it was that the painters of the first Venetian school became familiarised with a style of colouring more rich and vivid than was practised in any other part of Italy, and they were among the first who substituted oil painting for distemper." Yet the pictures of the Vivarini still adhere to the older method; indeed, all the works we have hitherto enumerated are in tempera or distemper on wood. It is not, however, on casual view very easy to distinguish between oil and tempera, because the tempera surface has usually received for protection varnish or some glossy coat. Yet another school of the quattrocento—that of Umbria—receives illustration in a picture of "St. Michael and the Dragon," by the Dominican friar, Fra Carnovale. The figure of the saint, which is nearly life-size, and drawn with a firm outline, has the smoothness, delicacy, and tenderness which mark this spiritual school of Umbria. We pass from easel to mural and fresco painting in two heads by Domenico Veneziano, who, nevertheless, ranks as one of the first painters in oil known in Italy; but the handling of these heads is manifestly that of fresco, yet, as often happens, the surface has lost its original aspect by preparations used to preserve the work from destruction. The number of frescoes that have reached England is necessarily small, and these two rare specimens of the process have value on many grounds. Again, we pass to another school, or

rather to another nationality, in an extremely choice panel picture by Vander Goes, of Ghent, a scholar and imitator of John Van Eyck, an artist who enjoyed a great reputation in the latter half of the fourteenth century. His works are scarce. Specially to be admired is the colour and the technical excellence of material and execution thus early perfected in Flanders. The pigments are unchanged and immovable as when first painted. This master-piece hangs as a pendant to the exquisite Memling already possessed by the Gallery. Furthermore, our all but unexampled collection of the works of Rembrandt receives a most important addition in "The Portrait of an Old Lady." This is one of the master's strongest and most characteristic heads; the paint is powerful in impasto, yet liquid. The master's oft-tried opposition between black dress, white frill, and rich-toned flesh has been turned to the utmost account. The head is amazing for individual character. We may, in conclusion, observe on the apparition among the old masters of Reynolds' portrait of Lord Heathfield. It is satisfactory to see how England's great colourist holds his own in competition with Rubens and Moroni. Gainsborough, under like trial, wins equal victory; that master work in landscape art, "The Watering Place," recently removed from Kensington, absolutely gains by juxtaposition with Claude and Poussin.

Manufactures.

Feat of a Sheffield File Maker.—The *Ironmonger* records that a few weeks since a file 19 in. long, 8 in. wide, and 1 in. thick, was cut at Messrs. Samuel Newbould and Co.'s, Bridgefield Works, Sheffield. The chisel used in cutting it was upwards of 12 in. in length, and had been made and was held by Samuel Brooks. The striker, with a hammer 22 lb. weight, was Richard Wilson, and not a foul stroke was given. The file is rough on one side, and bastard-cut on the other. Not one of the workmen, except the cutter, could be found to say that it was possible to cut so large a file in one row; but the success was most complete. The file was admired on account of its perfect truth and level. The novelty in the file is this, that, instead of being over-cut and up-cut in rows, one row suffices for over-cutting and one for the up-cut. It is, consequently, truer than it could have been by the other process.

Fish-hook Machinery.—The *New York Tribune* says:—"At New Haven, Connecticut, we were lately taken to a building in which some scores of men and women were making fish-hooks of various sizes, with machinery invented by Dr. C. O. Crosby, of that city. Into each of the machines, wire of a given size was rapidly passing from a reel, fashioned somewhat like the 'swifts' of our Yankee grandmothers, and being automatically cut into the requisite lengths, bent, flattened at one end, sharpened to a point at the other, bearded and dropped into a box under the machine, needing only to be tempered to make them as perfect, efficient fish-hooks as were ever seen—a single workman thus making 60,000 fish-hooks in a day of ten hours. We said he makes them, but that is inaccurate; he supplies the wire, and then looks on while the machine makes them, without a fault or a possibility of defect, as fast as shingle nails can be made, and equal to any ever used. That they are cheaper than any other need hardly be added. Hitherto we Americans have fished with British-made hooks; but that day is over. The European hooks have till now been made by hand—slowly, clumsily, expensively. We read recently in *The Working Man* (British) an account of the fish-hook manufacture in England, which seems, in the light of what we saw in New Haven, the description of some antediluvian process, invented by Tubal Cain. The wire is first cut by shears, then heated, then rubbed, then bearded, then pointed by filing, then bent, then shanked, then scoured, then blued or japanned, when they are ready to be counted, papered, and labelled. Each of this is a distinct manual process; and the aggregate cost (not including the material) must be ten times that of making by the automatic Crosby process."

Commerce.

The Chambers of Commerce of France.—An incident has just occurred which can scarcely fail to have some beneficial effect on the commerce of France, and, indeed, of Europe; the Chamber of Commerce of Rouen addressed a circular to the other Chambers with the view of establishing full inquiry into the condition and wants of the commercial world, and received cordial replies to its applications from all sides, and which were published in the *Journal de Rouen*, with the view to draw forth more facts respecting the financial and commercial condition of the country. But it appeared, by an official warning given to the Rouen Chamber, that there exists a ministerial injunction, bearing date 1806, against the interchange of communication between Chambers of Commerce; and that, therefore, the publication of any such documents could not be permitted. The prohibition in question has naturally given rise to many comments, and it is scarcely to be doubted that a Government which has done so much for the improvement of industry and commerce will take the necessary measures not only to remove the prohibition in question, but also to aid the Chambers in collecting and promulgating all the facts and evidences which may be useful in solving commercial questions, and aiding the great industries of the country. This old prohibition may then be converted into a valuable instrument of commercial reform.

Colonies.

Statistics of Tasmania.—The estimated population of the colony was 97,368 on 31st December, 1866, showing an increase of 2,167 during the year. The general revenue receipts for the year were £245,421, and the expenditure £245,361 7s. 6d. The territorial receipts amounted to £88,342, and the expenditure was £106,740. The commissariat expenditure was £56,460. The total value of the exports was £834,606, against £880,965 in the previous year; and the value of the imports £942,107, against £762,375 in the preceding year. There were 643 vessels, with a tonnage of 10,793 tons, entered inwards, or an increase of 7,627 tons over last year. There are 11 steamers, of a tonnage of 2,944 tons, and 200 vessels, with a burden of 16,825 tons, belonging to the ports of Launceston and Hobart Town. Nine vessels were employed in the whale fishery, and the quantity of oil taken was 380 tons, valued at £38,000. In the year 1866 the quantity of land sold was 61,368 acres, realising £35,623; at the end of the year 2,251,071 acres were held under depasturing licenses, at a rental of £9,303 per annum. The total quantity of land in a state of cultivation was 279,022 acres, of which 111,156 acres were not under crop. The total acreage under wheat was 71,348; oats, 34,358; peas, 3,655; potatoes, 10,820; barley, 4,596; hay, 33,762; tobacco, 216. There is a large increase in oats, peas, potatoes, and tobacco. The total number of horned cattle in the colony was 88,370, 21,567 horses, 1,722,804 sheep, 2,486 goats, and 33,259 pigs.

The Imports of Australian Wool have increased very largely again this year, having attained an aggregate in the four months ended 30th April, of 32,708,929 lbs., against 21,934,222 lbs. in the corresponding period of 1866. In 1866 the total quantity of wool imported

was 113,772,694 lbs., against 109,734,261 lbs. in 1865; 59,166,616 lbs. in 1860, 47,489,650 lbs. in 1854, and 30,034,567 lbs. in 1848, so that in 20 years the imports of Australian wool have thus increased more than fourfold.

Notes.

Cleaning Printing Type.—The cleaning of metal type, and still more of wood blocks, is a matter of very great importance, not only as regards the good printing, but especially as respects the preservation of the blocks. M. Leblanc Hardel, a printer, of Caen, complained to a chemist, M. Guerard Deslauriers, of the ill-effects of turpentine, and that gentleman, after having made experiments, recommended the use of an essence of petroleum. The advice was followed, and after eighteen months' experience, the report is, that the petroleum, volatilizing rapidly, does not gum up the type, in fact leaves nothing on the face of the metal but a little white powder which is easily removed by means of a soft brush—that it does not injure blocks, has no effect in opening the pores of the wood, but on the contrary hardens the surface, renders the face of the wood peculiarly smooth and consequently increases the fineness of the work produced—lastly, the cost of the petroleum is less than half that of turpentine, and the rapidity with which it dries allows the forms to be washed without removing them from the press or machine.

New Method of Feeding Sheep.—A grazier in the Pas de Calais, named Pentefort, has introduced the following novel and clever method of economising his green crops: he places on the ground a rack or fence across the whole field, and the sheep feed between the bars. When the animals have consumed all the herbage within their reach, the rack is moved forward so as to give them a fresh supply of forage. Of course, the rack is so made that the sheep cannot jump over it. It is evident that regularity in cropping and in the distribution of the manure, as well as great economy, must be the result of this novel system.

School of Mining at St. Etienne.—The Minister of Agriculture, Commerce, and Public Works has just issued a new programme for this useful school, the conditions contained therein to come into force next session. The subjects required from candidates for admission are—the French language, arithmetic, geometry, algebra, rectilineal trigonometry, and descriptive geometry, the same as are required for the examination of a bachelor in science, with the exception of metallurgy, the elements of linear design, and ordinary drawing, and the execution of problems in descriptive geometry. Candidates are received between the ages of sixteen and twenty-five, but soldiers and sailors, who have served their time in the army or navy, are admitted up to the age of twenty-eight. Previous to the examination for admission to the school, candidates are required to undergo a preliminary examination before an engineer of mines, or of roads and bridges, except in the case of pupils of the Polytechnic School who have taken a second-class degree.

Great Balloon at the Champ de Mars.—The fine balloon constructed by M. Giffard, and to be seen at M. Flond's machine works, just without the limits of the International Exhibition, is attracting great attention, both in the scientific and fashionable world. The object of M. Giffard is to obtain a balloon capable of carrying a considerable weight, entirely under control, and able, if necessary, to remain in air during fifteen days or more. These desiderata are attained by the use of a peculiar material in the construction of the balloon itself, of pure hydrogen gas, and of powerful machinery, by means of which the balloon is rendered captive, and drawn down to earth at pleasure. It is said that the construction of the balloon is so perfect, that the loss of gas is reduced to an insignificant quantity. The contents of the balloon are equal to five thousand cubic mètres; its car carries thirteen persons, besides the two aeronauts, and it is attached to a steam-engine by means of a cable three hundred mètres in length; the ascent and descent only occupies about ten minutes, and it makes thirty or forty voyages a day. The object of M. Giffard is scientific experiment, and especially with regard to the electrical phenomena of the atmosphere; the present ascents are merely preparatory, and with a view to obtain funds for future serious undertakings; many ladies, including the Empress, have made the ascent, and, with one exception, we have never heard of any terror being felt. The wind, of course, causes the balloon to deviate at times considerably from the straight line, but the steam machinery has it in complete command, and the movements of the gigantic pear-shaped body are singularly majestic.

Sanitary Measures at Havre.—Since the establishment of a regular line of steamers between Havre and the United States, the Government has occupied itself constantly with the means of securing the town against the invasions of cholera, yellow fever, and other epidemics. At present every vessel that enters Havre is placed under the inspection of an officer of health, and any vessel having had deaths on board during her passage, or having any sick on board, is sent to quarantine at the lazaretto of Tatihou, in the Manche; the former of these precautions is, however, deemed insufficient, and the latter objectionable, especially in the winter season, as causing the sick to be submitted to an extra sea voyage, and the dangers of a difficult navigation. The subject having been inquired into it has been determined to create at Havre a sanitary establishment, like those which exist at Marseilles, and at the mouths of the Gironde and of the Loire. A large lazaretto is to be formed, but, pending the consideration of two proposed sites, a small establishment is at once to be prepared for the reception of passengers who cannot be at once admitted to free pratique. The lazaretto will consist of two parts, one for the sick and the other for those who are simply under the observation of the sanitary officers. The cost of this temporary place of quarantine is estimated at less than £3,000, and it is ordered to be carried into execution without delay.

MEETINGS FOR THE ENSUING WEEK.

Mon.....Entomological, 7.
Tues ...Anthropological, 8.
Statistical, 8. Mr. Hyde Clarke, "On Public Instruction in Turkey."
Civil Engineers, 8. Renewed Discussion upon Mr. Byrne's paper, "On the Removal of Organic and Inorganic Substances in Water."
Wed ...Society of Arts, 8. Opening Address by the Chairman of Council.
Geological, 8. 1. Mr. N. Whitley, "On supposed Glacial markings in the Valley of the Exe." 2. Mr. S. V. Wood, jun., and the Rev. J. L. Rome, "On the Glacial and post-Glacial Structure of Lincolnshire and S.E. Yorkshire." 3. Mr. A. B. Wynne, "On Disturbance of the Level of the Land near Youghal."
Thur ...Linnæan, 8. 1. Dr. Hance, "On Chinese *Corylaceæ*." 2. Mr. Scott, "On *Isoetes capsularis*, R."
Fri .....Quekett Microscopical Club, 8.

Patents.

From Commissioners of Patents' Journal, November 8th.

Grants of Provisional Protection.

Air-compressing apparatus—2978—F. Seiler.
Alumina—2952—W. Crossley and T. C. Hutchinson.
Balloons—3036—M. Henry.
Boats, facilitating, ascending and descending rivers, &c.—3040—V. Cresalles.
Boilers—3000—W. and D. Fisken.
Boilers, &c., heating water for—2773—J. H. Nelson and T. Briggs.
Bolts and nuts—2954—C. D. Abel.

Bolts and nuts, securing—3054—J. Maddocks.
Bottles, &c.—3013—L. Newton and T. Kershaw.
Bottles, vases, &c., ornamenting—2570—S. Brown.
Bottling apparatus—2994—S. Stackard.
Bread, &c., ozonized—2975—T. Welton.
Buffers, &c.—2992—J. Mitchell.
Buildings, &c., ventilating—2968—J. White.
Buildings, &c., ventilating—3060—A. V. Newton.
Cartridge cases—2958—C. Duncombe.
Cattle, &c., regulating the supply of food to—3010—P. Love.
Cocks or valves for discharging water, &c.—3004—H. Wilson.
Cornices, &c.—2938—F. W. Waide.
Cotton, &c., cleaning—3048—J. H. Johnson.
Croquet mallets—3024—J. Asser.
Fans for ventilating mines, &c.—2964—T. Lemielle.
Fibrous substances, spinning, &c.—2932—T. Whitehead.
File blanks—2972—W. Gray.
Files, cutting—2990—J. Dodge.
Furnaces—3042—E. B. Wilson.
Gas and coke—3032—J. Young.
Gaseliers, &c.—2970—H. W. Sambidge.
Hats and bonnets—2927—E. T. Hughes.
Horse ploughs—3052—W. H. A. Bowhay.
Hydrocarbons, &c., burning the gases arising from the distillation of liquid—3014—G. and E. Dorsett and J. B. Blythe.
Indicators—3012—J. A. Hopkinson and J. Hopkinson, jun.
Iron—2657—J. Hargreaves.
Knitting frames, circular—2628—H. M. Mellor.
Manures and disinfectants—2984—F. Gerhartz.
Meat, &c., preserving, curing, &c.—3006—W. R. Lake.
Metallic screws, moulds for making—3038—W. Potts.
Musical instruments—3044—J. Smyth and S. Kirby.
Printing from metal plates and lithographic stones—3034—A. J., W. B., and S. H. Waterlow.
Railway and other brakes—3026—A. M. Clark.
Railways—2955—J. Hunter.
Reaping and mowing machines—3022—C. E. Hall.
Rice, &c., decorticating—2916—T. Bell and J. Richardson.
Sewing machines—2962—T. Webb.
Shuttle tongues—2974—J. Haddock.
Spinning machinery—2996—J. H. Johnson.
Urine, &c., treatment of—2998—R. Weare.
Valves—2812—J. Goodfellow.
Valves—2854—J. Withinshaw and J. E. Baker.
Valves, &c.—2980—A. M. Clark.
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Wood, preparing—2904—W. E. Newton.
Yarns—2660—A. L. Dickins and H. Heywood.
Yeast, separating from liquid matters—2652—W. Hall.

Patents Sealed.

1379. R. Andrew.
1396. J. Reilly.
1400. J. Piddington.
1407. W. R. Lake.
1409. J. G. N. Alleyne.
1412. H. A. Bonneville.
1419. E. Field.
1424. B. Barrett & H. Mackenzie.
1537. C. E. Brooman.
1561. H. Frost and H. Frost, jun.
1603. C. E. Brooman.
1721. J. Millward.
2059. P. M. A. Laurent.
2330. C. E. Flower.
2520. A. V. Newton.
2600. W. E. Newton.

From Commissioners of Patents' Journal, November 12th.

Patents Sealed.

1408. G. A. Neumeyer.
1420. J. Clark.
1426. J. G. Jennings.
1427. A. M. Clark.
1428. E. Walker.
1430. J. C. Ellison.
1431. C. Brazil and R. Grime.
1432. H. C. Baildon.
1433. E. Smith.
1435. C. Perry.
1436. W. Clarke and E. Walker.
1443. E. Edwards.
1447. J. M. Napier.
1448. G. T. Bousfield.
1449. J. H. Johnson.
1454. J. M. Stanley.
1456. F. P. Warren.
1461. A. L. Dowie.
1466. G. Bernhardt.
1471. J. L. Clark.
1477. A. H. Brandon.
1494. H. Chamberlain.
1495. J. G. Tongue.
1512. J. Stenhouse & J. Duncan.
1521. W. J. Murphy.
1588. T. Mitchell.
1595. W. B. Ritchie and J. G. Willans.
1697. H. Rolle.
1776. P. Welch.
1805. J. Ward and F. Dressler.
1853. H. Veillon.
1879. W. R. Lake.
2075. F. D. Nuttall.
2189. T. Greener and W. Ellis.
2253. G. W. Dinsdale.
2694. C. D. Abel.

Patents on which the Stamp Duty of £50 has been Paid.

2740. J. Sullivan.
2741. J. Snider.
2764. W. B. Adams.
2771. W. K. Hall.
2832. G. E. Noone.
2940. L. Valant.
2773. J. H. Johnson.
2800. W. Willis.
2859. R. Allinson and H. Lea.
2794. J. McCall and B. G. Sloper.
2784. J. Thompson.
2785. J. Dale, H. Caro, and C. A. Martius.
2789. J. Robinson & J. Gresham.
2792. M. W. Ruthven.
2807. J. Kinniburgh.
2883. A. A. Croll.
2901. W. E. Newton.
2788. J. A. Manning.

Patents on which the Stamp Duty of £100 has been Paid.

2742. A. J. Sedley.
2771. H. E. West.

Registered Designs.

4890—October 12th—Boot-jack—C. Hull, Birmingham.
4891—October 15th—Part of a clybarn wrench—Wynn and Co., Birmingham.
4892—October 15th—The domestic washer—W. Spalding, Lincolnshire.
4893—October 16th—A portable gas stove—J. Wright, 16, Albion-street, Birmingham.
4894—October 17th—Bank note label—S. Stephens and Co., 2, Parliament-street, Dublin.
4895—October 18th—An improved foot-warmer—T. S. Hall, Truro.
4896—October 25th—An improved castor—E. Whalley and W. Jardine, Union-street, Blackburn.
4897—October 25th—Arm for mantel-piece banner screen—W. Tonks and Son, Birmingham.
4898—October 26th—A trousers' protector—J. White, High-street, Manchester.
4899—November 7th—A bedstead mount or top—Key and Hoskyns, Birmingham.
4900—November 7th—Calkins' writing desk for the blind—J. G. Calkins, Clayton-street, Kennington, S.
4901—November 8th—A heating apparatus for sewing machines—E. Waterman, Rupert-street, Bristol.
4902—November 11th—Self-acting window sash fastener—J. Trail and F. Gomm, 6, Norfolk-street, Mile-end-road, E.

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Catalogue of the Library of the Board of Trade, compiled by W. M. Bucknall	Compiler.
Essay on Trisection, with diagrams, by Joseph Seers	Author.
Treatise on Arithmetical Composition and Resolution, translated from the Latin by Mr. Raphson, 1720	Mr. Joseph Seers.
Annual Report of the Art-Union of London, 1866	
Photographs of the Restoration of Ratisbon Cathedral	Dr. Schubarth.
The Railway, Banking, Mining, Insurance, and Commercial Almanack for 1867	Editor.
The South Wales Gazetteer, 1866	New South Wales Government.
Comparisons of Standards of Length	Secretary of State for War.
Work on Textile Manufactures and Costumes of India, by Dr. Forbes Watson	Secretary of State for India.
Prof. Hofmann's Report on Chemical Laboratories of the Universities of Bonn and Berlin	Committee of Council on Education.
Transactions of the Royal Society of Victoria, 1865-6	Society.
Transactions of the Institution of Engineers in Scotland, 1865-6	Institution.
The Ocean Telegraph Cable, by W. Rowett	Author.
Symons's British Rainfall, 1866	"
Treatise on Watch Work, &c., by T. C. Scotchford	"
Statistics of New Zealand, 1865	Governor of New Zealand.
Translation of Correspondence between Saint Martin and Baron de Liebistorf, by E. Burton Penny	E. Burton Penny.
Man, his True Nature and Ministry, translated from the French of Louis Claude de Saint Martin, by E. Burton Penny	"
Catalogue of the Hebrew Books in the Library of the British Museum, by J. Winter Jones	Trustees.
Specimens of Typography, by Gaetano Nobile, Naples	G. Nobile.
Archæologia, or Miscellaneous Tracts relating to Antiquity, Vol. xl., Part 1	Soc. of Antiquaries.
Transactions of Royal Society of Edinburgh, 1865-6	Society.
Proceedings of " "	"
A New Idea for the Water Supply of Towns, by A. S. Ormsby	Author.
Transactions of the Institution of Naval Architects, 1866	Institution.
Debrett's Peerage for 1867	Publishers.
" Baronetage and Knightage for 1867	"
" House of Commons for 1867	"
Report on the Calcutta Cyclone	Meteorological Committee of Calcutta.
Catalogue of Sculpture, Paintings, Engravings, &c., belonging to the Corporation of the City of London	Town Clerk of London.
Official Record of the Intercolonial Exhibition of Australasia, 1866-67	J. P. Knight.
Transactions of the American Institute, New York, 1863-6	Institute.
Successful Oyster Culture, by Harry Lobb	Author.
The Educational Calendar and Scholastic Year Book for 1867	F. Marcus.
The Common Sense of English Orthography, by E. Jones	Author.
Management and Education of Blind Children, translated from the German by the Rev. W. Taylor, F.R.S.	Rev. W. Taylor.
Catalogue (English version) of the Paris Universal Exhibition of 1867. (55 copies for distribution among the artisans sent to Paris by the Society)	Messrs. J. M. Johnson and Sons.
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Memoirs of the Geological Survey of India, Vol. v., Parts 2 and 3	Geological Survey of India.
Do. do. (Palæontologia Indica), Parts 10-13, 3rd Series	"
Annual Report of do. for 1866	"
Catalogue of the Organic Remains of the Cephalopoda	"
Catalogue of the Meteorites	"
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Report on the Hygienic Condition of the Mercantile Marine, and on the Preventable Diseases of Merchant Seamen, by Harry Leach	,,
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Proceedings of the Royal Society, 1866-7	Society.
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Watts' Dictionary of Chemistry (in continuation)	
The American Journal of Science and Arts	Messrs. Silliman & Dana.
Proceedings of the Royal Geographical Society	Society.
Smithsonian Report, 1865	Smithsonian Institution.
,, Miscellaneous Collections, Vols. vi. and vii.	,,
A New Chemical Nomenclature, by S. D. Tillman, A.M., New York	Author.
Annual Report of the Secretary of War of the United States	Secretary of War.
Forty-eighth Annual Report of the Controllers of Public Schools of Pennsylvania, 1866	Edward Shippen, Philadelphia, U.S.
Catalogue and Annual Reports of Harvard College, U.S.	Harvard College.
Proceedings of the Zoological Society of London	Society.
Transactions of ,, ,, Vol. vi., Parts 1-3	,,
Memorie del Reale Istituto Lombardo di Scienze e lettere, 1866	Institute.
Reale Istituto Lombardo di Scienze e lettere. Rendiconti. Classe di Scienze Matematiche e Naturali, 1866	,,
Do. do. Classe di Lettere e Scienze Morali e Politiche, 1866	,,
Regulations for Preventing Collisions at Sea, by Thomas Gray	Author.
Report of the Proceedings of the British Association at Nottingham, 1866	Association.
How to develope Productive Industry in India and the East, by P. R. Cota	Author.
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Journal of the Geological Society.
Journal of the Linnæan Society.
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Journal of Science.
Journal of the Statistical Society.
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